Book of Posters

CUNY Research scholars Program (CRSP) & Louis Stokes Alliances for Minority Participation (LSAMP) – Spring 2023

Potential application of alkali halide filters for imaging of key minerals in fresh porous fruits.

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Abstract

There is a significant interest in quality control of salts by mammography imaging and electrical resistance measurements. This experiment shows X-rays can be manipulated by salt filters to generate modified beams based on Compton scattering. This can be used to enhance or steal intensity from nearby iron complexes that are difficult to image by high energy commercial X-ray beams. This will be extended for various salts including effects of Gd complexes to prepare scattered X-ray beams (dispersed in energy spectrum). While it is accepted that dry fruits maintain the nutrient content, our prior works by this group have shown a dynamic readjustment in mineral distribution with heat shocks and drying of fruits. The researchers hypothesize that iron (Fe), copper (Cu) and manganese (Mn) distribution depend on surface charges and surface areas available and is responsible for biomineral distribution at cortex and cores of fruits. A drawback of current characterization tools is the lack of knowledge about oxidation or charge states of nutrients and minerals during ripening and drying of fruits. The role of moisture in tissue is hard to understand but seems to control internal tissue geometry. This work plans to demonstrate if spectrally multi-energetic X-ray beams produced by alkali halide filters can characterize the porosity changes between fresh and dried states in model fruits. A potential application would be the tissue structure changes in radiation resistant tumors and during wound healing where tissue fluid affects imaging results. Current radiological tools with X-rays or MRI do not address such internal tissue texture changes. This work focuses on the role of moisture or tissue fluid on X-ray scatter compared to dry tissue.

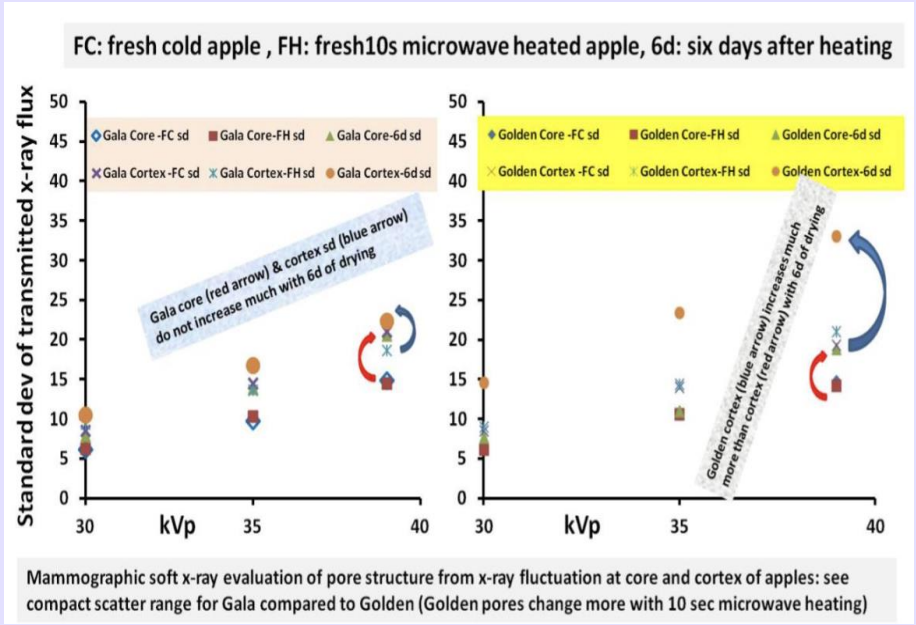
Introduction

Compton scatter involves high energy x-rays (relative to k- edges and l-edges) of the primary beam that undergo a change of direction from their original path during the process of atomic ionization.
The x-ray beam is attenuated by mostly Compton and photoelectric interactions. Minimum readout value and maximum readout value within an ROI with a salt (compared to air shots) are important in our experiments. The min values indicate the pixels with the maximum attenuation. The max values (as increased from air shots) indicate scattered x-ray photons reaching a certain pixel or regions of no attenuation (if no relative increase from air shots).
The X-rays photons interact with the electrons in the atoms of substances to produce an image. This happened in two ways, scatter, or absorption. Scatter is where the energy of the photon is partially absorbed and the direction changes, while absorption is where x-ray beams photon is completely absorbed by the atom. The main form of scattering (97%) comes from Compton interaction.
Absorption is also known as photoelectric absorption or photoelectric election. In this interaction the x-ray photon interacts with an inner shell electron. The energy of the photon is absorbed by the electron (photoelectron) which is ejected from the atom. The x-ray photon ceases to exist, and no radiation leaves the atom.
Salts are ionic compounds composed of different metals and non-metals of varying atomic numbers. Furthermore, these salt crystals have different sizes and shapes. The orbital electrons and shapes of these crystals will absorb and scatter different photons from our x-ray beam to produce an image on the image receptor of the x-ray machine.

Method

Four salts were utilized in this experiment (alkali halides): Sodium Bromide (NaBr), Potassium chloride (KCl), Sodium chloride (NaCl), Potassium bromide (KBr).
However, two were preferred: NaBr and KCl.
This was because Sodium chloride (NaCl) was too light and not capable to absorb valuable amounts of energy. Potassium bromide (KBr) proved to be difficult to analyze. NaBr and KCl were best options due to their similarity: both NaBr and KCl have a total of 18 electrons, with 7 electrons in the outermost shell of the anion (–Br and –Cl) atoms and 1 electron in the outermost shell of the cations atom (+K and +Na).
Materials used: Hologic Mammography machine (high sensitivity x-ray machine); Various ionic salts: NaCl, KCl, NaBr, KBr, Radiolucent Materials (materials that do not significantly affect an x-ray beam): Paper, Paper Plates and positioning aids.
The salt was arranged on the receptor plate as shown in Figure 2 which indicates a 15 cm x 15 cm exposure field. Individual pen caps were used to separate the individual grains of salt.
Took 4 different types of apples: Fuji apple, Golden apple, Granny Smith and Gala apple. Took a slice of each apple and made an exposure of it and labeled it as cold. Heated each apple slice for 10 seconds in a microwave and made exposures to show mineral content. These heated apple slices were labeled as hot. The absorption pattern of each filter was analyzed and used to identify varying minerals in the apples.

Results



Mammographic soft x-ray evaluation of pore structure from x-ray fluctuation at core and cortex of apples: see compact scatter range for Gala compared to Golden (Golden pores change more with 10 sec microwave heating)

Fig 1.

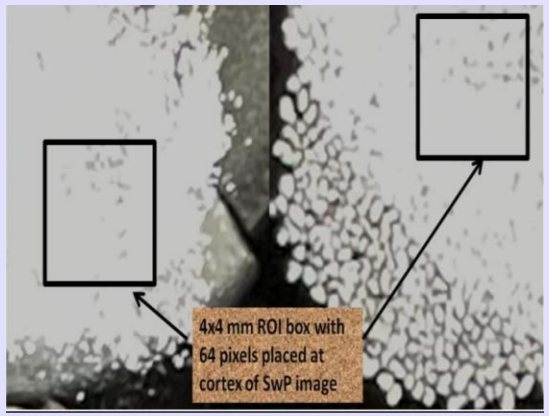


Fig 1. Alkali halide filtered analyzed regions for fresh apples

Fig. 2.

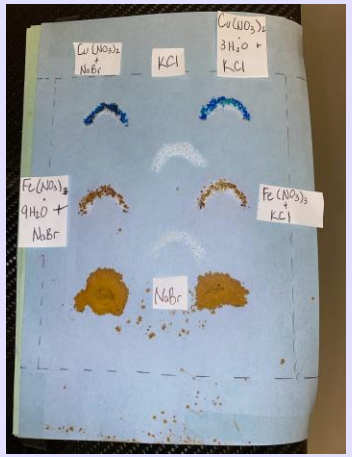


Fig 3.

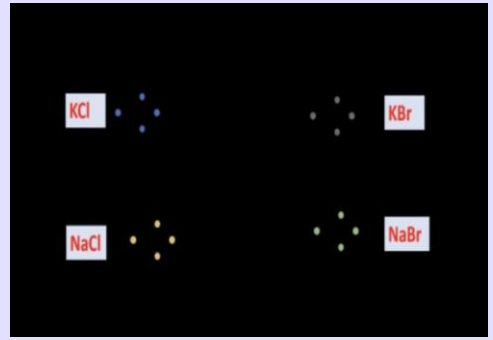


Fig 3.
Showing salts energy levels
Used KCl and NaBr which are the similar brightness meaning has similar energy level.

Conclusion/Next Steps

The results indicated that Compton scatter can be manipulated via the different types of salts. One may conclude that in our simple salts x-rays are trapped before getting scattered and harmonic detection may explain bright intensity observed in some of the salt clusters. Spectrally multi-energetic x-ray beams utilized on dried heated Golden and Gala apples, indicated changes in porosity of both apples. X-ray evaluation of pore structures of Gala and Golden apples demonstrated Golden apple's pore structure had a greater difference when compared to Gala's pore structure.

At the current moment, we are still experimenting with different filters and halide salts. Thus, we do not have a concrete conclusion. This ongoing research will be continued during the summer utilizing other advanced structures along with the halide salts.

Acknowledgment

Sincere gratitude is expressed to the faculty and staff of NYCCT for providing this opportunity to be engaged in this experiment. as well as the stipend from CUNY Research Scholars Program. Special thanks to Aaliyah Salmon, Aravis McBroom, Joanna Syska,Somdat Kissoon, Ayesha Arooj, Derbie Desir, Robert O'brien, Zuonie Ke, Sab Rakhmatova, Jennifer Padilla, Anjalee Rabbani, and Anam Riaz. Thank you for the continuous support.

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Title: Evaluation of Alkali Halide Filters for Porosity Imaging in Dry Porous Media

CRSP Researchers: Aaliyah Salmon, Joanna Syska, & Aravis McBroom **Mentors:** Subhendra Sarkar & Zoya Vinokur

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Abstract

Previous works from our laboratory studied X-ray and MR imaging of first-row transition metals in a porous matrix of fruits as models for biological systems. We hypothesize that Fe, Cu, and Mn distribution depend on surface charges and surface areas available and is responsible for biomineral distribution at the cortex and cores. Hence, this work aims to generate enough low-energy X-ray scatter radiation without using heavy metals or high keVs to image minor mineral distributions at different regions of a model biological tissue. Although porosity and texture vary substantially in many tumors, the density and composition do not. In addition, X-rays are not sensitive to first-row transition metals that are vital for biochemical pathways. For this reason, tumor imaging is challenging by routine X-rays that primarily depend on tumor density or a high degree of metallic compositions, which are not naturally present in tumors. This work plans to demonstrate if spectrally and angularly divergent X-ray beams using Compton energy loss by alkali halide layers can produce observable image differences from region to region due to texture and pore variation in dry fruits geometry than hard beams without broad scattered X-ray contents.

Methods

This experiment was conducted by gathering the compounds Potassium chloride, Potassium bromide, Sodium chloride and Sodium bromide. Individual grains of each salt was placed in an L-shape on paper using pen caps to lift grain and toothpick to distribute them on. A stack of 39 sheets of paper were placed under the extra sheet holding the grains on the mammography image receptor. The constants used were 20 & 25KvP, 4, 16, 25 mAs, inherent filter (AG), no grid, and small focal spot. After conducting the experiment, the region of interest was taken in the clusters and surrounding them. This was then analyzed and turned into data.

Results

Radiation Intensity(mAs) for 20 kvp	Air medium(control) covariance (Air CV%) 20 kvp	39 sheets of gapless cellulose paper at 20 kvp	3 stacks of 13 = total of 39 papers spaced with air gaps
4	2.29	2.34	2.25
16	2.04	2.39	2.4
65	1.39	2.04	2.14

Radiation Intensity(mAs) for 25 kvp	Air medium(control) covariance (Air CV%) 25 kvp	39 sheets of gapless cellulose paper at 25 kvp	3 stacks of 13 = total of 39 papers spaced with air gaps
4	2.04	2.36	2.38
16	1.34	1.79	1.84
65	0.8	1.31	1.4

Fig 1. Tables of the results of exposures taken of air through stakes of paper

Fig 2. Arrangement of salt that were to be exposed

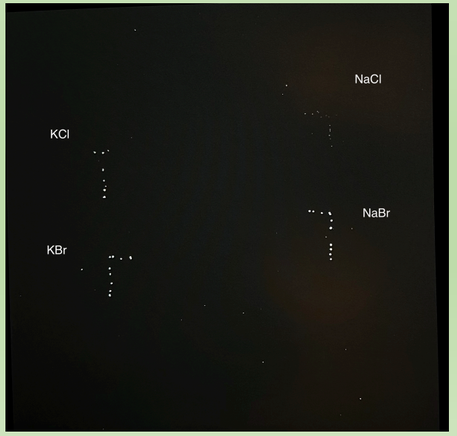

Fig 3. Exposure of the salts on the paper

Discussion

The experiment was broken into two parts. This semester we focused on the halide filters in a simpler biological matter like paper. Next semester we will be utilizing halide filters with more complex biological structures like apples. This experiment mimics naturally occurring compounds in the brain and how different levels play a part in different diseases like Alzheimer's. The Compton Steal Effect was seen in this experiment. The number of x-rays detected (mean value in ROIs) as well as the spread in the number of photons in pixels near the grains is somewhat less (low standard deviation in counted photons within the ROIs) as per the figures provided. This experiment shows that X-rays can be manipulated by salt filters to generate modified beams based on Compton scattering. This can potentially be used to enhance or diminish the intensity of iron complexes for neurodegenerative diseases in vivo that are usually difficult to image by high-energy commercial X-ray beams in CAT scans.

Conclusion

Our hypothesis regarding Compton Steal seems to be true since we did see the number of x-rays detected in the pixels near the grains decreased. Our next phase is using this hypothesis that salts are an x-ray filter in more complicated biological m structures.

Acknowledgments

We like to thank the school, faculty, and staff for allowing us to carry out these experiments. We look forward to continuing on with this rewarding work. Thank you to our fellow Rad Tech researchers Katie, Angela, Robert Somdat, and Daler. A special thanks to the mentors for their continued support and endless guidance.

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HOW WILL CLIMATE CHANGE AFFECT THE FUTURE 2.0

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Mentor: Professor Farrukh Zia - Computer Engineering Technology Department

ABSTRACT

Climate is an important aspect of the world we live in today.

It dictates the major characteristics of our lives . Climate dictates whether our crops will grow or not , the clothing we wear , the food we'll be able to eat , plant and harvest and so much more . The main question is how it will affect the future as there are many effects happening now in the ecosystem we currently have and they are not beautiful . These effects will lead to tremendous circumstances that we will have to navigate changes toward. Necessary changes are needed to prevent a nuclear wipeout of the earth we know and love . If our climate is not where it's supposed to be then our lives will change drastically and definitely not for the best and the world we come to know and love will eventually be no more.

INTRODUCTION

Global climate change is not a future problem. Changes to Earth's climate are driven by increased human emissions of heat-trapping greenhouse gasses that are already having widespread effects on the environment: glaciers and ice sheets are shrinking, river and lake ice is breaking up earlier, plant and animal geographic ranges are shifting, and plants and trees are blooming sooner. Effects that scientists had long predicted would result from global climate change are now occurring, such as sea ice loss, accelerated sea level rise, and longer, more intense heat waves. If this isn't a wake up call to what we need to do as a unit in the world we live in then what is? Global warming impacts everyone's food and water security. Climate change is a direct cause of soil degradation, which limits the amount of carbon the earth is able to contain. Some 500 million people today live in areas affected by erosion, while up to 30 Percent of food is lost or wasted as a result. Meanwhile, climate change limits the availability and quality of water for drinking and agriculture. In many regions, crops that have thrived for centuries are struggling to survive, making food security more precarious. Such impacts tend to fall primarily on the poor and vulnerable. Global warming is likely to make economic output between the world's richest and poorest countries grow wider. This is a wake up call to the world WAKE UP , LIFE AS WE KNOW IT IS AT RISK.

LITERATURE REVIEW

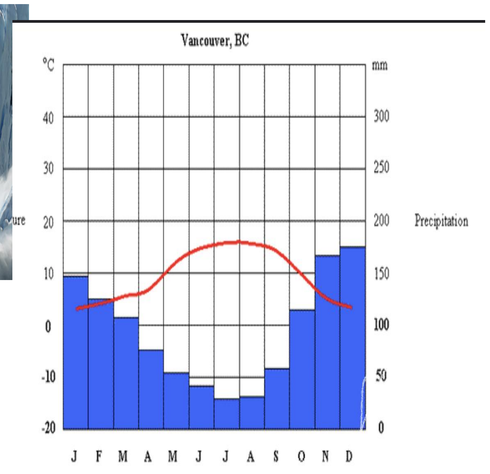
last four years were the four hottest on record. According to a September 2019 World Meteorological Organization (WMO) report, we are at least one degree Celsius above pre industrial levels and close to what scientists warn would be "an unacceptable risk". The 2015 Paris Agreement on climate change calls for holding eventual warming "well below" two degrees Celsius, and for the pursuit of efforts to limit the increase even further, to 1.5 degrees. But if we don't slow global emissions, temperatures could rise to above three degrees celsius by 2100 , causing further irreversible damage to our ecosystems.Glaciers and ice sheets in polar and mountain regions are already melting faster than ever, causing sea levels to rise. Almost two thirds of the world's cities with populations of over five million are located in areas at risk of sea level rise and almost 40 per cent of the world's population live within 100 km of a coast. If no action is taken, entire districts of New York, Shanghai, Abu Dhabi, Osaka, Rio de Janeiro, and many other cities could find themselves underwater within our lifetime, displacing millions of people.Disasters linked to climate and weather extremes have always been part of our Earth's system. But they are becoming more frequent and intense as the world warms. No continent is left untouched, with heatwaves, droughts, typhoons, and hurricanes causing mass destruction around the world. 90% of disasters are now classed as weather- and climate-related, costing the world economy 520 Billion USD per year , while 26 million people are pushed into poverty as a result.

RESEARCH METHODOLOGY

The first thing I did during this research was to take a look at my previous research and check the correlations during that 1 year period . I wondered if there was anything done differently over the one year period to slow climate change and also how we can reverse some of these Climate change effects without taking away necessary sustainability needed for human and animal survival. Research shows that improvement to energy efficiency and vehicle fuel economy , increases in wind and solar power , biofuel from organic wastes, setting a price on carbon and protecting forests are all potent ways to reduce the amount of carbon dioxide and other gasses trapping heat on the planet. There is a sum of 520 Billion being spent per year in fixation to climate change . My question is , is it enough?

DATA ANALYSIS

Take a look at the rate at which climate change has increased throughout the years.



RESULTS

The IPCC's Sixth Assessment report, published in 2021, found that human emissions of heat-trapping gasses have already warmed the climate by nearly 2 degrees Fahrenheit (1.1 degrees Celsius) since pre-Industrial times (starting in 1750). The global average temperature is expected to reach or exceed 1.5 degrees C (about 3 degrees F) within the next few decades. These changes will affect all regions of Earth.The severity of effects caused by climate change will depend on the path of future human activities. More greenhouse gas emissions will lead to more climate extremes and widespread damaging effects across our planet. However, those future effects depend on the total amount of carbon dioxide we emit. So, if we can reduce emissions, we may avoid some of the worst effects.While science tells us that climate change is irrefutable, it also tells us that it is not too late to stem the tide. This will require fundamental transformations in all aspects of society — how we grow food, use land, transport goods, and power our economies. While technology has contributed to climate change, new and efficient technologies can help us reduce net emissions and create a cleaner world. Readily-available technological solutions already exist for more than 70% of today's emissions.

CONCLUSION

To conclude ,climate change interacts with global trends such as use of natural resources, growing urbanization, social inequalities, losses and damages from extreme events and a pandemic, jeopardizing future development.

Based on our last research , what is being done right now is that they are trying to reduce U.S. greenhouse gas emissions 50-52% below 2005 levels in 2030. Reach 100% carbon pollution-free electricity by 2035. Achieve a net-zero emissions economy by 2050. Deliver 40% of the benefits from federal investments in climate and clean energy to disadvantaged communities. If this is done effectively then we can survive but If God doesn't will it then we have no help except for him.

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Additive Manufacturing Process Development of Geopolymer Based Habitable Construction on Space

Student: Husnain.k, John.A, Maria., Charudatta.M
Mentor: Akm S. Rahman
New York City College of Technology
Department of Mechanical Engineering Technology

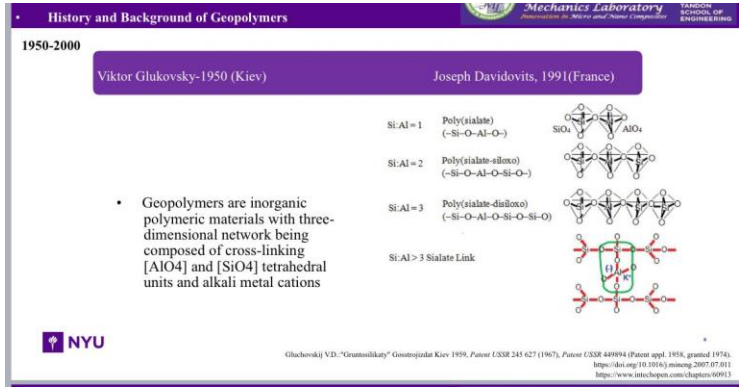
Abstract:

Extraterrestrial travel and housing are topics that have come up in recent times. There is a possibility of living on the moon. In order to do that while keeping costs at a minimum, we are researching and developing a geopolymer using lunar dust to 3D print houses on the moon. Because we are using lunar dust, the number of materials that need to be shipped out gets cut dramatically. We are studying the composition of both lunar mares and lunar highlands in order to fully understand what needs to be added to make a strong durable geopolymer that can withstand the varying factors and temperaments of the moon. By looking at aluminum and silicon ratios, as well as KOH, we aim to create a geopolymer that can make houses on the moon.

Proposed Project

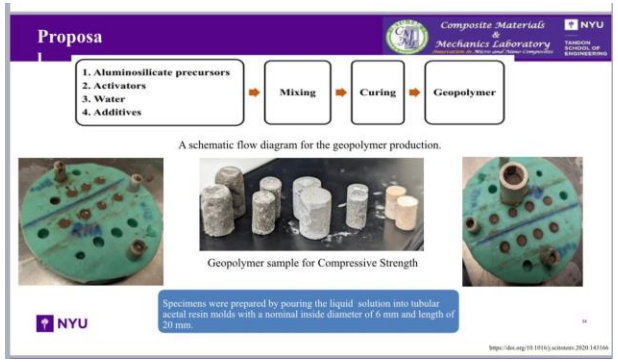
The manufacturing of cement demands the burning of vast quantities of fuel, as well as significant emissions of CO_2 resulting from the decomposition of limestone.

Geopolymers and Geopolymeric materials



Geopolymer Production

- Geopolymer production is made by reacting aluminate and silicate bearing materials with a caustic activator, such as fly ash or slag from iron and metal production.



Conclusion

The end goal of creating a lunar based geopolymer for the construction of habitats off-world will be understood further through testing of mechanical characteristics as well as other types of material testing.

Designing a Student Questionnaire to Research Issues of Retention in the Communication Design AAS/BFA Program

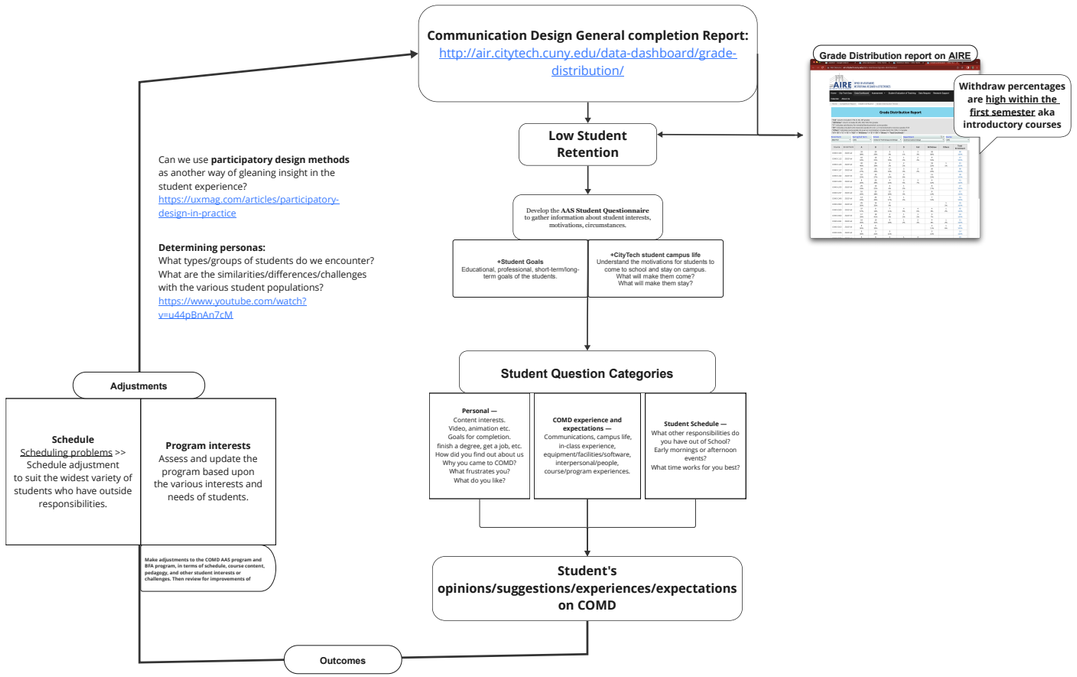
Professor Daniel Wong, Communication Design, City Tech, CUNY
Undergraduate Researchers: Frank Lema (COMD), Abdullah Momin (CST)

Introduction:

The purpose of this research touches upon the understanding of why students withdraw from different courses within communication design at any stage. Student retention in the program is a big concern. We do not know the exact reasons why they leave the program. We will help to Identify the problems students might face, such as scheduling conflicts and teacher-related issues, which is critical to finding effective solutions. Additionally, it is important to identify ways to keep students engaged and excited about the program, which can help increase student participation rates. By understanding course content and program expectations, students can feel more engaged with the curriculum, leading to higher learning rates.

Methods:

We aim to execute a variety of activities. We are designing a set of questionnaires to collect information on student motivations, expectations, and frustrations. The questionnaires will cover multiple aspects, including who, what, where, why, when, and how, to achieve a comprehensive understanding of the challenges faced by students. The questionnaires will be distributed at key points during the semester and to specific courses to obtain relevant data. The obtained responses will be evaluated to provide feedback that can be utilized to enhance future course instruction. The students will be categorized into various groups to better comprehend the diverse challenges faced by each group. We will also create Miroboard to visualize the research design and outcome analysis. Additionally, previous research endeavors will be scrutinized, and prior initiatives will be expanded upon to ensure that the research is exhaustive.



Outcomes/Results:

With a new questionnaire for students we hope to discover the reason for students dropping out. School schedule not lining up with theirs, course expectations not being met or even poor connection with professors. With that we look forward to adjusting the courses into being more interactive with students. Keeping freshman numbers from dropping. As well, with continued interviews we look forward to expand more into the skills necessary for future COMD graduates in their fields of preference.

Conclusion:

We intend to implement practicable changes to scheduling for students. Present the course details to students in advance so they know what they are going to be studying with visually appealing projects, or even meeting some of the professors beforehand. As well as trying to adjust courses to suit the expectations of the students by questioning previous students who have taken the course. Finally, determine when students might be having difficulties in the courses to help facilitate their success by using more class time to meet with students and getting an idea for their projects.

Acknowledgments:

Special Thanks:
Professor Daniel Wong, Chair & Professor Department of Communication Design, City Tech, CUNY
Other team members:
Frank Lema(COMD), Abdullah Al Momin(CST)

Fatimah Asad
Professor Lubie Alatriste
CSRP Undergraduate Research

I. Introduction

In this project, we can examine the benefits of online education as well as its shortcomings. We aim to look at specific areas such as STEM and compare them to social studies. We want to see if there is any difference in how students perceive online education based on their area of study. We hypothesize that STEM may be more challenging to do online, but our results, which we can collect via carefully designed survey instruments, will either confirm or disconfirm the hypothesis.

II. Research questions

- How are the benefits of online education affecting students?
- How are specific areas of STEM compared to (social) research studies?
- Is there a difference in how students perceive online education based on their area of study?
- How can STEM be more/less challenging online?
- Do students favor remote learning over personal, or hybrid learning?

III. Data Collection -

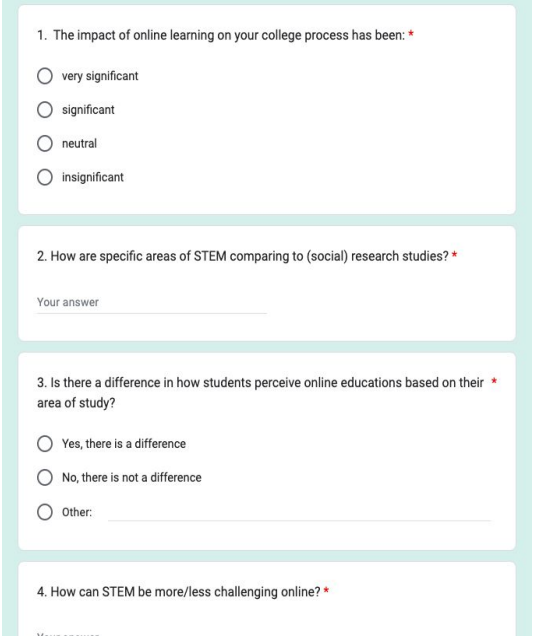
IV. Data Analysis (Partial as the research is ongoing).

V. Preliminary Findings

4 students shared that they prefer in-person learning, 4 students shared that they prefer hybrid learning, and 4 other students shared that they preferred remote learning. Our experience with COVID tells us nothing about the possibilities of publicly available virtual learning as part of our educational environment since most teachers were inexperienced virtual teachers and few had the assistance or time to learn how to teach successfully online. We know that effective education, both virtual and in-person, involves students interacting with the teacher and with one another about the subject (Durant, 2022).

VI. Conclusion.

Increased contact points between instructor and student and between peers (e.g., phone calls, small group teaching, and focused feedback) improved the quality of virtual learning, but few teachers have learnt how to foster dynamic interactions in their classrooms (Mineo, 2022). As a result, for many students, virtual learning is still a poor substitute for in-person education.



Fernando Santana
CityTech
Prof. Dr. Lubie Alatriste

Mental Illness & Medicine

Introduction

Mental illnesses are one of the things that affect our health the most, but at the same time it is one of the things we pay the least attention to as a society. Diseases and mental health have a significant effect on our physical health, since the mind has a power over the body that many are unaware of.

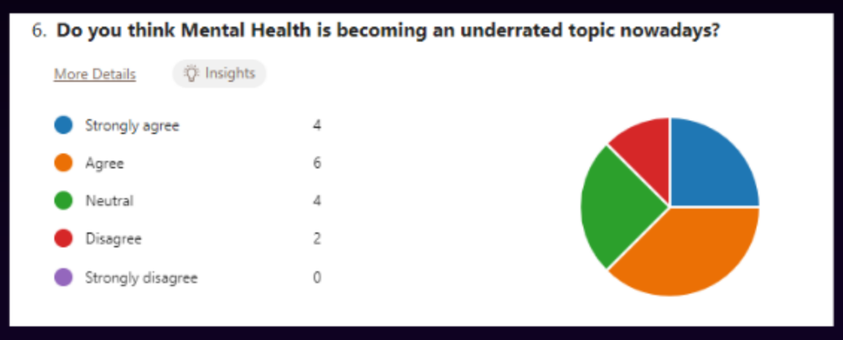
The objective of this project is to raise awareness among City Tech students about mental health, how to detect and improve it, and the relationship between good mental health and the act of healing in the body, since good mental health can help us to be more productive by feeling motivated, and in turn helps to cope with situations of constant stress in medical patients in the process of recovery.

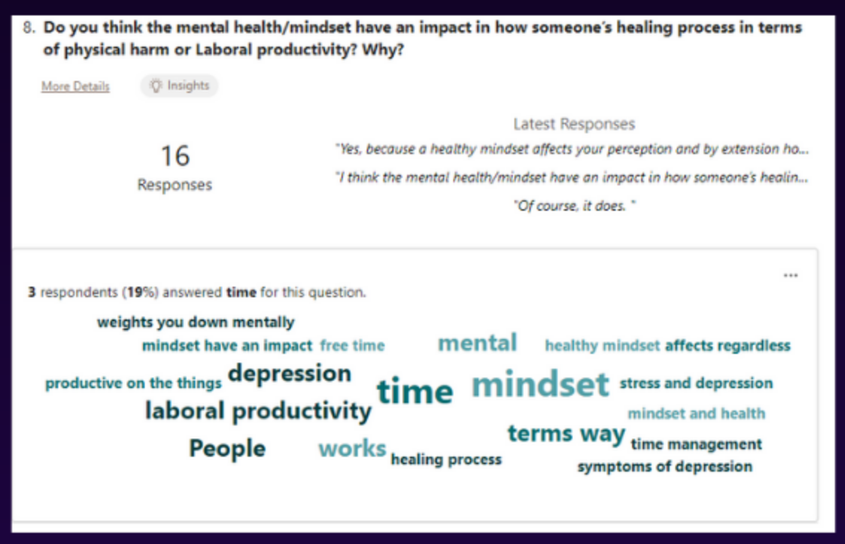
Collected Data Analysis

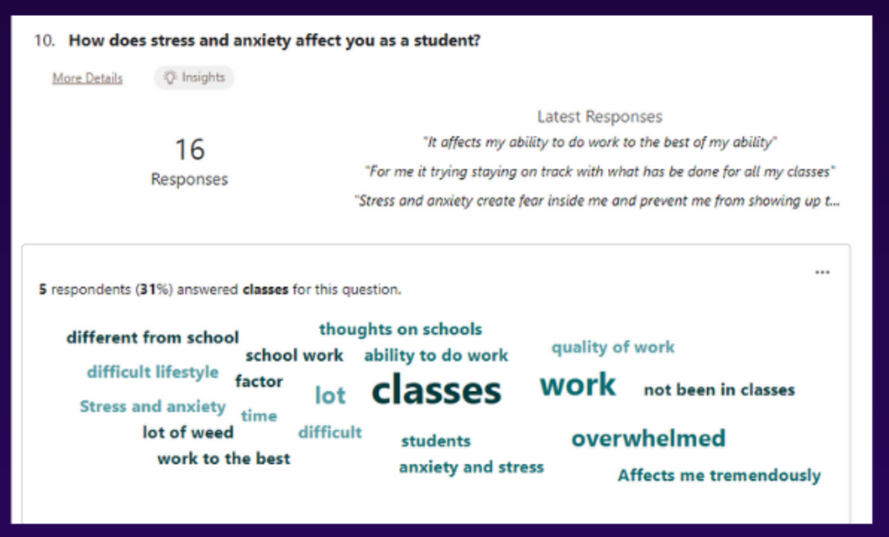
For images 1 and 2 we see that the students are aware that mental health is a topic that is hardly talked about. An issue that affects them both professionally and personally, since several answers repeat the same concept of "stress does not let me work to my full potential", which for City Tech should be a priority since an educational institution must focus on its students. Image #3 is the most worrying, since we see that some students resort to the use of drugs and external agents to combat those mental distractions that torment them and prevent them from functioning properly.

Not to mention that many agree and tell their own experiences or that of family members that, thanks to poor mental health, their recovery process has been affected, which is also worrisome.

Survey Results







Research Survey

As a research method, I will use a virtual questionnaire that will help us understand the perspective, opinions and thoughts of the students on the research topic.

1. What is your age?
2. What is your GPA?
3. What are you majoring in?
4. How many credits do you have acumulated?
5. What is your race and ethnicity?
6. Do you think Mental Health is becoming an underrated topic nowadays?
7. How would you aid someone that is getting drowned in depression?
8. Do you think the mental health/mindset have an impact on how someone's healing process in terms of physical harm or laboral productivity? Why?
9. Do you think more financial resources should be applied to mental health and psychology research?
10. How does stress and anxiety affect you as a student?

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Conclusion

The issue of mental health is an issue that unfortunately is overshadowed by other issues of greater volatility in these times, since people normally think that these things are private matters or that they do not have such great importance, when the opposite is true. The purpose of this research is to generate awareness in our society in order to avoid the mental degeneration of people due to poor mental health, because how many more suicides, students with bad grades and people with dementia do we have to see daily to reach out a hand?

Acknowledgement

This research is possible thanks to my mentor Prof. Dr. Lubie Alatriste, huge thanks to her guidance, advices and patience.

Soaring Cost of Air Ambulances
Implications for Patient Access and Financial Burden

Gabriel A. Martinez
Professor Jose Luis Martinez,MS, RT(R)(CT)(MR)

Abstract

Air ambulances are a vital component of emergency medical transport for critically ill and injured patients. However, the rising cost of air ambulance services has become a growing concern for patients and healthcare providers worldwide. This research project aims to investigate the implications of increasing air ambulance costs on patient access and financial burden, with a focus on the United States

The study utilized a systematic review of existing literature and data analysis to evaluate the impact of increasing air ambulance costs on patient access and financial burden. The findings revealed that the cost of air ambulance services has increased significantly in recent years, resulting in a significant financial burden for patients and their families.

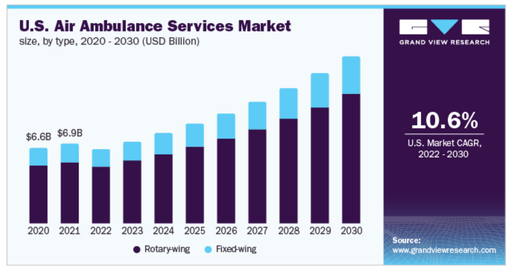
This research edeavor sheds light on the escalating cost of air ambulance services and its impact on patient access and financial burden. The findings suggest that there is a need for greater transparency and regulation of air ambulance costs, as well as innovative solutions to improve access to this vital healthcare service.

Methodology

Research Design:
This study utilized a systematic review of existing literature and data analysis to evaluate the impact of increasing air ambulance costs on patient access and financial burden. It was chosen for this study as it allowed for the inclusion of a wide range of sources and the ability to compare and contrast findings across studies.

Sampling Strategy:
To identify relevant literature for the systematic review, we conducted a search of the PubMed and Scopus databases, as well as relevant gray literature sources, using a combination of keywords related to air ambulance services and cost. We included articles published between 2010 and 2022.

Data Collection:
We conducted a comprehensive search of the identified databases and grey literature sources using the identified keywords, and manually screened the resulting articles for relevance based on their titles, abstracts, and full texts. We extracted data on study design, study population, outcome measures, vehicle type, and results. We then conducted a qualitative synthesis of the findings, identifying themes and patterns across the studies, which were, to say the least, shocking!



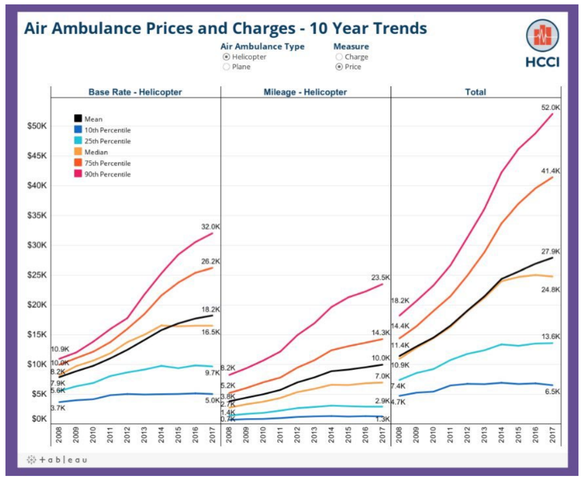
Results

Results
The average price of air ambulance services increased significantly **between 2007 and 2016, rising from $13000 to $50,000.** This represents a 285% increase in cost over the decade.

In fact, multiple air ambulance services often respond to the same crash sites in search of customers, which contributse to increased costs and financial burden for patients. Additionally, most air ambulance services are now provided by third-party companies rather than hospitals themselves, and private investors and companies have purchased helicopters and planes for air ambulance use, to be able to charge patients their own bills.

The cost of air ambulance services can be astronomical, with some bills reaching over $400,000, and the average reaching nearly $50,000 Furthermore, three companies control 75% of all vehicles used in air ambulance services, which limits competition and contribute to higher prices.

In addition, comapnies have been shifting to fixed wing aircraft to be able to charge more, even if rotary aircraft may be more effective



Conclusion

The soaring cost of air ambulance services is a critical issue that poses significant implications for patient access and financial burden. Our research highlights the need for greater transparency and regulation of air ambulance costs, as well as the importance of expanding access to this vital healthcare service outside of third party owners.

The practical implications of this study are of the utmost importance, as policymakers, healthcare providers, and patients can use the findings to inform their efforts to improve patient access and reduce financial burden. Establishing standardized pricing models and investing in telemedicine and other technologies could help connect patients with emergency medical care more quickly and efficiently, particularly in rural and remote areas.

In conclusion, our research underscores the urgent need for action to address the soaring costs of air ambulance services and improve access to emergency medical transport. We hope that our findings will contribute to ongoing efforts by Congress and other stakeholders to reduce the financial burden on patients and their families.

Acknowledgements

My deepest thanks to Professor Jose Luis Martinez for his effort and coaching during this research, along with my appreciation to the entire CRSP faculty for their utmost support and for the ability to research as an undergraduate.

Credits to the NIH, Scopus, and Dr. Marty Makary for references

Studying Factors of Environmental Injustice and Ways to Achieve Equity

Arham Hussain, Reginald Metellus , Advisor Prof. Marzi Azarderakhsh

Abstract

The urban heat island (UHI) with its significant energy, health, and societal impacts is among the major environmental issues in urban regions, especially in historically underserved and socially vulnerable communities (HUSVCs). In the 1930s, the former federal agency, Homeowners' Loan Corporation (HOLC), created "Residential Security" maps of major cities known today as "redlined" areas. These neighborhoods were often designated as "hazardous" due to the high percentages of people of color living there. Consequently, this led to systematic disinvestment based heavily on race. While the program ended in 1968, the impacts of discriminatory lending are still experienced in redlined areas in the form of urban hotspots. Fortunately, the advent of new technologies and availability of environmental data from satellites alongside ground observations such as ArcGIS and QGIS, could improve our understanding of these heat impacts as well as be used to develop, assess mitigation, and resiliency strategies.

In this study we employ land surface temperature data from satellite remote sensing to understand the distribution of summertime land surface temperature within the city's Census Tracts and redlining zones. To investigate the effect of recent developments and citywide mitigation efforts on the impacted neighborhoods, the results are extended to past decades. Landsat-5 land surface temperature product is used for the comparison of demographic data since 1990's.

Introduction

- In the 1930s the former federal agency, Homeowners' Loan Corporation (HOLC), created "Residential Security" maps of major cities.
- Areas were bordered off and rated for mortgage lending ranging from A to D (D being the most hazardous).
- Neighborhoods were often designated as "hazardous" due to high percentages of people of color living there, leading to systematic disinvestment based on race.
- These D zones, colored red on the original HOLC maps, are known today as "redlined" areas.

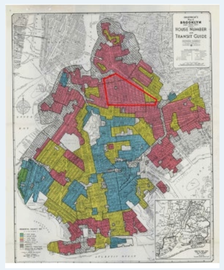


Figure 1. 1936 Homeowners' Loan Corporation (HOLC) Residential Security map.

Methods and Data

- The following research consists of data pulled from the NYC open Database for demographic information and US Census Bureau for census from 1990 to 2020.
- In addition, satellite imagery such as Landsat 5 from 1988 to 2010 and Landsat 8 from 2013 to present with 30m multi-spectral spatial resolution is used to retrieve maximum summer land surface temperature maps.
- We employed Google Earth Engine Cloud space to put the Landsat imagery from USGS and aggregate them for each of the census tracts and NYC Redlining classes A to D.

Table 1. Band and wavelength information for Landsat 5 (left) and 8(right) in orbit

Landsat 5 TM		
Bands	**Wavelength (micrometers)**	**Resolution (meters)**
Band 1 - Blue	0.45-0.52	30
Band 2 - Green	0.52-0.60	30
Band 3 - Red	0.63-0.69	30
Band 4 - Near Infrared (NIR)	0.76-0.90	30
Band 5 - Shortwave Infrared (SWIR) 1	1.55-1.75	30
Band 6 - Thermal	10.40-12.50	120* (30)
Band 7 - Shortwave Infrared (SWIR) 2	2.08-2.35	30

	Bands	Wavelength (micrometers)	Resolution (meters)
Landsat 8 Operational Land Imager (OLI) and Thermal Infrared Sensor (TIRS) Launched February 11, 2013	Band 1 - Coastal aerosol	0.43 - 0.45	30
	Band 2 - Blue	0.45 - 0.51	30
	Band 3 - Green	0.53 - 0.59	30
	Band 4 - Red	0.64 - 0.67	30
	Band 5 - Near Infrared (NIR)	0.85 - 0.88	30
	Band 6 - SWIR 1	1.57 - 1.65	30
	Band 7 - SWIR 2	2.11 - 2.29	30
	Band 8 - Panchromatic	0.50 - 0.68	15
	Band 9 - Cirrus	1.36 - 1.38	30
	Band 10 - Thermal Infrared (TIRS) 1	10.60 - 11.19	100
	Band 11 - Thermal Infrared (TIRS) 2	11.50 - 12.51	100

- Table above shows typical bands for Landsat 5 and 8 satellites, from which, surface temperature bands 6 and 10 respectively with cloud percentage less that 15% is selected for this study. To investigate temperature variability since 1988 to present, composite summer temperature maps are created.
- However, all the satellite imagery were on presented as a raster layer (pixels) that was needed had to be converted a to polygon layer in order to obtain mean surface temperature within 2020 census tract boundaries all NYC.
- To get the data within each census tract, QGIS was used to analyze the geospatial data (raster layers) from Google Earth Engine Code Editor and then to be analyzed further in Excel.
- Using QGIS, every census tract's land surface temperature as well as using census data from 1988 to 2020.

Results

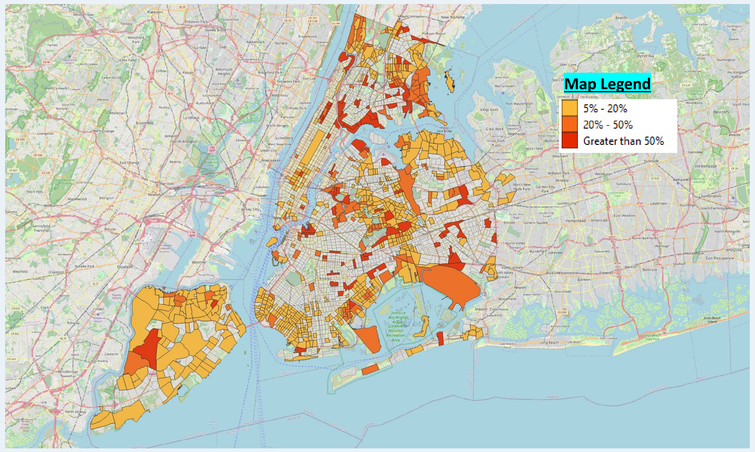


Figure 2. Minority Population Change more than 5% in NYC.

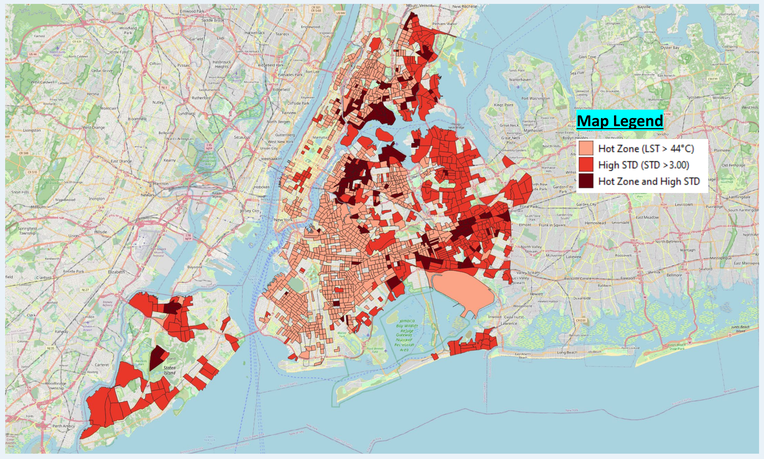


Figure 3. The standard deviation of all census tracts from 1988 to 2010 and 2014 to 2020 is 2.75. The average mean temperature of all census tracts is 43.31°C. Any census tract higher than average (44 °C) or STD more than 3 are shown in the figure above.

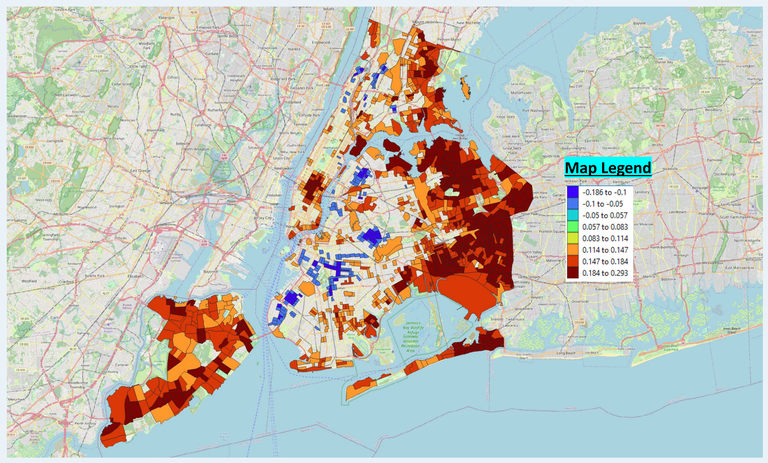


Figure 4. The map above indicates the change of temperature from 1988 to 2020. The blue represents areas that are cooling down while red areas show areas that are warming up.

Results continued

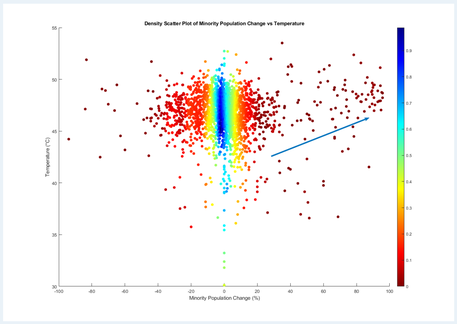
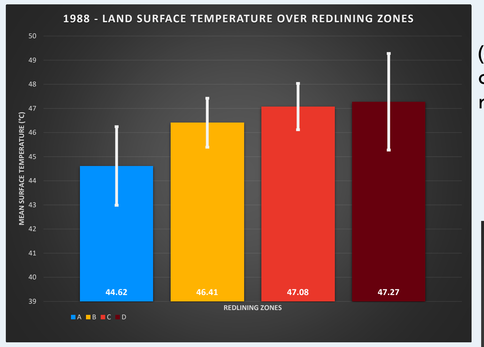
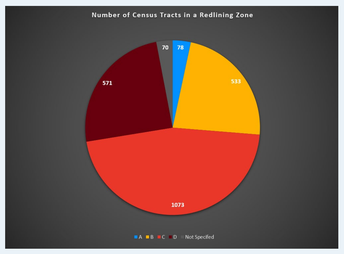


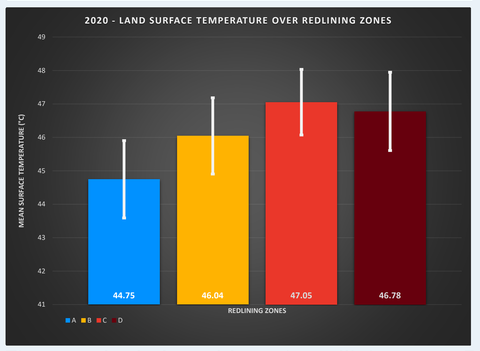
Figure 5. Density Scatter Plot showing a correlation between temperature and Minority Population Change (plot done on MATLAB).



(a) The figure to the left shows census tracts divided into their respective redlining zones for 1988.



(c) The pie chart above shows number of census tracts divided into their respective redlining zones.



(b) The figure to the left shows census tracts divided into their respective redlining zones for 2020.

Figures 6(a-c). A cooldown in redlining zone D can be seen over decades. Also as clearly seen, majority of census tracts are in redlining zones C and D. In 2020, it seems that Zone C which majority of census tracts are in is the hottest zone not Zone D. This shift happened due to cooling over time in Zone D.

Conclusions and future work

- Our results indicate that regions that either were labeled as "C" or "D" (most "hazardous" areas) have on average 2 degrees Celsius higher surface temperature than regions with "A" and "B" labeling (most reliable for investment).
- While the decadal analyses reveal that the gap has slightly reduced over time between these neighborhoods (mainly due to gentrifications that have happened in underserved communities), the issue still persists.
- These results highlight that heat stress mitigation and adaptation strategies require including these factors in how they should be spatially implemented in heterogeneous urban areas both in terms of land cover and socioeconomics.
- To conclude, this is an ongoing research project, and more data has yet to be collected and analyzed for future findings.

Acknowledgements and References

This project was funded by CUNY-BRESI, CUNY Research Scholars Program (CRSP), and LSAMP.

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City Prime A Heteromorphism Robot

Iqra Khan
Mentor: Xiaohai Li
Robotics and Intelligent Systems Lab
Department of Computer Engineering Technology
www.citytechrobotics.org

Abstract

In this research project, we will design and develop a heteromorphism robot that can reform its structure and locomotion mechanism between a ground rover and a humanoid robot depending on the environment, terrain, and desired tasks. Such robots may find great use in disaster search and rescue situations. Our project will create a novel robotics platform that may lead to new application opportunities for robotics in disaster response, service, education, and other related fields.

In this project, we will first design and build a humanoid robot, then create additional morphism and locomotion mechanism design, and add and integrate additional components to enable heteromorphism. We will program the robot to perform various tasks including changing from a ground rover form to a humanoid form. Currently we are working on designing a testbed, testing the servos, and determining the torque requirements of the motor used in the robot's design. This will enable us to ensure that the motor can withstand the weight of the robot's body in both its ground rover and humanoid forms. Once we have determined the required torque, we can finalize the project design.

Introduction

The motivation of this project is to develop the second generation of the prototype heteromorphism robot built by a former research student at City Tech Robotics Lab. The previous prototype consists of twenty servos present in the joints of the robot to induce movement, and network controller and program were developed to control the robot. For the second generation, we plan to develop more effective and efficient locomotion mechanism and transformation, incorporate more sensing capabilities into the robot and elevate autonomy and intelligence.

Methodology

We attached two servomotors and observed the behavior of the motors.
Additionally, we aim to quantify the torque output of a servo motor using a pendulum test methodology. A rod is affixed to the motor, and a mass is suspended from the rod's end. We employ an inertial measurement unit (IMU) to determine the motor's acceleration, which is used for the torque calculation.

Lastly, we have produced some design concepts for the robotic system.

Figure 1: Picture of two motor link

Results

Based on our observations of the motor link, we inferred that it was able to support the weight of one additional motor, but it is uncertain whether it can withstand the weight of multiple motors or the entire robot Our robot design involves incorporating many more motors, and it's imperative to ensure that each motor can withstand the load of the entire robot. Thus, we have to find the actual torque of the motor via the pendulum test.

As of the writing of this research poster, the pendulum test to measure the torque produced by the servo motor has not yet been conducted.

We are still in the process of finalizing the design of the robot, and one of our main priorities is ensuring that its weight is distributed evenly.

Conclusion

The project is still in progress and we are taking the necessary measures to ensure that our final robotic design meets and exceeds our expectations in terms of its functionality, design, and overall performance.

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The Impacts of Climate Change

Author: Junxi Chen

Mentor: Prof. Ann Ngana Mundeke

Abstract

Climate change is long-term shifts in temperatures and weather patterns by human actions. as most scholars including physicists, climatologists, meteorologists, historians, and geographers would agree. However, Climate change has brought significant and increasingly devastating changes in the world. This Research Project points out the main factors that cause climate change. The impacts of Climate Change are numerous including economic impacts, social impacts, and environmental. This project focuses on the economic impacts of climate change. The study recalls recent cases of natural disasters and the tremendous economic impacts they have caused

Introduction

Why is it important to conduct research about climate change? It is important to conduct research about climate change k now factors that cause Climate change in order to help the global community. Climate change is caused by human actions. Climate change is a global issue that has a great impact on economic development. The direct impact mainly includes the impact of extreme events on the economy. For example, droughts, storms, and rising sea levels may lead to reduced income for farmers. The main cause of global warming is that human beings have used a large amount of mineral fuels for nearly a century and emitted a large amount of indoor air. And the results it produces will redistribute global precipitation, melt glaciers and ice, and rise sea levels, endangering nature. The balance of the ecosystem threatens the food supply and living environment of human beings. Global warming is no stranger to people, but we have not paid attention to the serious consequences it will bring

Pros and cons

Climate change may boost the development of renewable energy. As global warming intensifies, people are becoming more aware of the harmful effects of fossil fuels, and thus the demand for renewable energy is increasing. This will promote the development of renewable energy such as solar energy and wind energy, thereby creating more job opportunities and economic growth. After all, climate change is the evil result of human beings, and our environment cannot be damaged because of this. Because the earth is the only living home for human beings, climate change is just because the destruction of human beings exceeds the evolutionary load of the earth, so various extreme weather will appear. Under this background, the development of a low-carbon economy is promoted. The development of a low-carbon economy is also an adjustment of economic structure when people face climate change, which is very future and forward-looking. Although this kind of economic development is said to be slower or more expensive, it will be of great benefit to the past. The climate problem is a very special problem, because it is a global system, and the global weather and oceans flow around the world. When a country's oceans are polluted, the pollutants will drift to various places with the ocean currents, and when a country is emitting a large amount of toxic gasses, the toxic gasses will also be carried to various places with the wind. Therefore, climate change actually promotes mutual cooperation among countries and also promotes economic globalization. Countries have also signed various agreements and conventions, hoping to improve climate change. In short, it will affect economic development, and at the same time cause some economic losses, it will also affect the sales of many products, and it will affect the situation of economic development, which is very unfavorable to economic development.

impact

The global consensus that advanced economies are better able to adapt to climate change has recently been challenged: a study in the United States based on local data showed that daily temperatures above 15°C significantly reduce personal income. Simultaneously study temperature at the cellular level. Relationship with economic growth, the predicted temperature increase was found to have a significant negative impact on economic growth in the United States and Europe. Across Europe, moderate temperatures had a negative impact on GDP in different regions. However, there is a significant negative impact on gross domestic product (GDP) across Europe at extreme temperatures, especially in the south, where some county-level regions experience a decline in GDP due to extreme temperatures. In addition climate change will lead to wages across Europe.Differences in levels, which could lead to migration of people from southern Europe to the north, especially to the Nordic countries. Contrast this with research on climate change in the Americas. One study of the climate in Mexico indicates that, despite being a developing country, Mexico ranks tenth globally in total greenhouse gas emissions and is ecologically vulnerable to climate change. Mexico's vulnerability to the impacts of climate change has prompted the country to announce a series of reductions in greenhouse gas emissions.

Climate change affects all regions around the world. Polar ice shields are melting and the sea is rising. In some regions, extreme weather events and rainfall are becoming more common while others are experiencing more extreme heat waves and droughts.
When we waste food, we also waste all the energy and water it takes to grow, harvest, transport, and package it. And if food goes to the landfill and rots, it produces methane—a greenhouse gas even more potent than carbon dioxide. About 6%-8% of all human-caused greenhouse gas emissions could be reduced if we stop wasting food.

ACKNOWLEDGEMENTS

Dr. Reginald Blake, the Provost. I thank Dr. Blake for encouraging students to conduct research projects and engage in learning.
· Dr. Renata Ferdinand, the Chair of the African American Studies Department. I took a course in her department that motivate me to conduct this research project.
· The Undergraduate programs and all the faculty members and staff who advised and give guidance to students
· Dr. Annie Ngana Mundeke, my professor and my mentor who helped me with advice and guidance.
· Last, not least my parents who encouraged me to go to college.

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Consequences of climate change(U.S)
Climate Change Science Program (U.S.); National Science and Technology Council (U.S.).
Climate Change, lmmink,Ron 2017

conclusion

To sum up, the impact of climate change on the economy has always been a research hotspot, but this does not mean that the research on climate change has gone deep enough. The consensus of scholars from all over the world is that more than 90% of climate change may be the responsibility of human beings themselves, and the decisions and choices made by human beings today will affect the trend of climate change. These studies show that climate change risks are characterized by complexity, intrinsic value, difficulty in quantification, dynamics, and objectivity. So far, research on the economic impact of climate change has focused on the agricultural sector and the financial system and climate policy.

People must take action to stop and slow the course of climate
change. I strongly suggest that everyone engages in learning
about climate change so that many people can protect the earth.

Code Cyber: Using an AI model to analyze the rate of inflation in the United States within a statistical and data science context

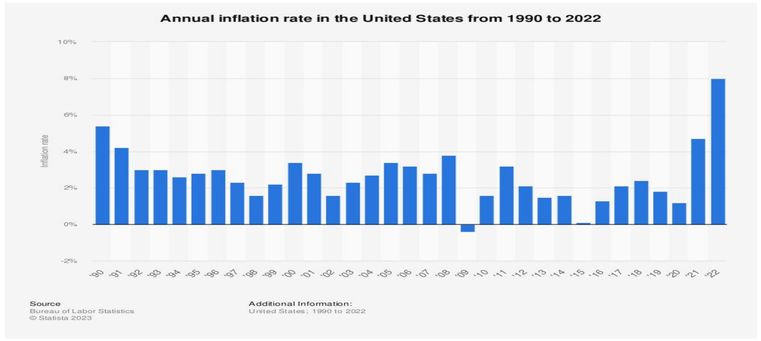
Team: Kazi Tasin,
Mentor: Professor Patrick Slattery

What is the aim of this project?

The future belongs to algorithms and machine learning. Our study's objective is to use data science to investigate and gather information to create an AI model from scratch that would assess and forecast the inflation rate in the United States. We found that to calculate the inflation; we need to create a formula and gather inflation rate data from 2000-2021.

How do we estimate inflation?

To estimate the inflation rate, we will examine the average inflation rate over the past 50 years and derive a formula based on the inflation trends. We will then use this formula to create a program that allows you to specify the year for which you wish to view the inflation rate, and it will estimate the rate using the formula derived from the inflation rate average.

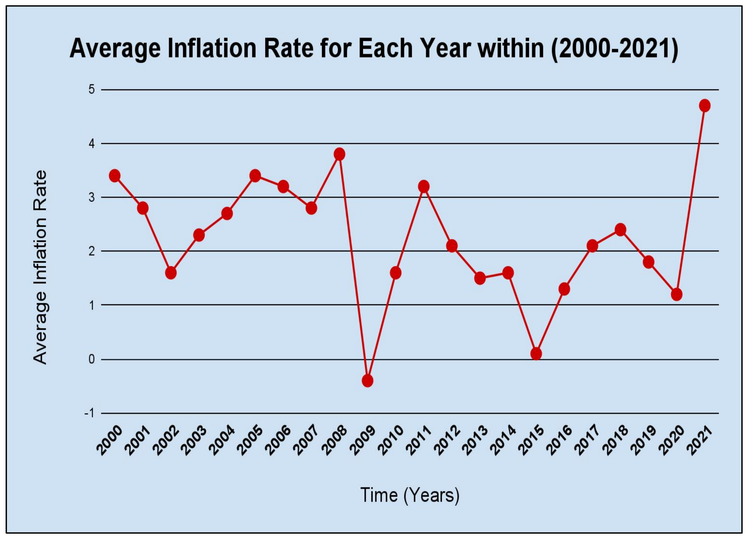


Source:https://www.statista.com/statistics/191077/inflation-rate-in-the-usa-since-1990/

What is Inflation and CPI?

- Inflation is a rise in prices, which can be translated as the decline of purchasing power over time.
- The change in the cost of a selection of products and services that particular groups of households normally buy is known as inflation as measured by the consumer price index (CPI).
- The average price shift over time has increased due to an upward rise in the CPI

Rate of Inflation Formula $= \frac{(CPI_{x+1} - CPI_x)}{CPI_x}$



How else is Inflation determined?

Inflation is not just determined by CPI (consumer price index). CPI is affected by things, such as politics and world events, thus to estimate an accurate inflation rate, one should examine years in which inflation surged, learn about the factors that caused that year, and compare to the prior year's average inflation rate.

How do we calculate inflation?

We use a formula involving the subtraction of the previous date's CPI (Consumer Price Index) from the current date's CPI and dividing the resulting number by the earlier date CPI. The findings are multiplied by 100. Your answer is the percentage rate of inflation.

Conclusion

The research will be expanded into a full-fledged program that will calculate inflation. We have acquired the necessary research to build upon it throughout the upcoming semester.

Citations

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The Motivating Factor Towards a Career in Radiologic Technology Medical Imaging at City Tech

Makadeer Kassim | **Dr. Jennett M. Ingrassia, Ed.D., R.T.**

CRSP Program - New York City College Of Technology

ABSTRACT

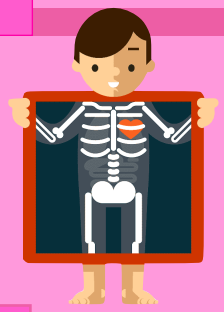
For this project, we wanted to look deeper into what the motivating factor is as to why students want to enroll in the Radiology Technology & Medical Imaging major. While it is an extremely competitive program to get into, it can sometimes discourage students from pursuing another career or profession without knowing the options offered. After speaking with a few people and seeing it on my own there was a realization that a lot of us lacked the information we needed to succeed in this field. This research primarily focuses on providing information to students and collecting data on the information before deciding on the Radiologic Technology major. A good start to this is to seek information from students previously or currently enrolled in the RAD 1124 Introduction to Radiologic Technology course at City Tech as to the reasons for taking this course. For example, are they interested in the Radiologic Technology profession or are they taking the course to fulfill a full credit load for the semester? If so what modality in the field do they want to pursue and do they know how City Tech can support them to fulfill that goal? We look forward to learning more as we go.

METHODOLOGY

For our method we will have an ongoing online survey. This will help us find out what information they know. This online survey will be conducted through "Survey Monkey"! To do so I will post the QR code around the school & directly asking students who finished the RAD 1124 course to participate in the survey. While conducting our research we came across a few articles that helped us develop questions for our survey.

SURVEY QUESTION TOPICS

- *Age*
- *Gender*
- *Demographics*
- *Generation*
- *Inartistic/Extrinsic Motivation*
- *External Factors*



WHAT TO KNOW!

So far from conducting this research, here is what students need to know about the admission process:

- *There is no application!- students are chosen based on preclinical performance & GPA*
- *Students must make sure to declare their major as a Radiology Technology student in order to be considered*
- *The Radiology department committee meets during the spring term to determine students for the fall semester.*
- *Pre Clinical requirements are as seen in figure 1.1*
- *GPA says 3.2 but department encourages 3.5+*

FUTURE DIRECTIONS

The next step for this research is to get results I gather from using survey monkey. In the next steps I will have known what the motivating factor for pursing an education in Radiology Technology. Below is a chart from another research on why students chose a career in the health field.

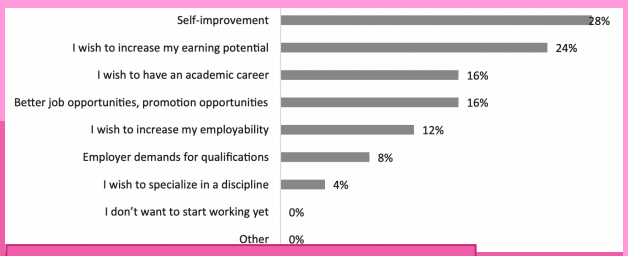


FIGURE 1.1

CONCLUSION

So far the conclusion of this research is that the path towards the Radiologic Technologist career is not easy. Over the years it has become a desired career & with that it becomes competitive. Students will feel discouraged when they come across the requirements & the course loads of these required classes. Also many are unsure of what modalities are there in the field & what they do. Lastly we discovered many factors that motivate students towards this field & we will put that to the test when we finalize the survey.

CITATION:Sá dos Reis, C., et al. "A Comparative Study about Motivations, Expectations and Future Plans for Professional Development in Four European Radiography Programs." Radiography, vol. 24, no. 4, 2018, https://doi.org/10.1016/j.radi.2018.05.007.

Comparing skin entrance doses in Abdominal X-ray with and without shielding.

Student Researcher(s): Ollana John, Lauren Gordon, Liana Reid
Faculty Mentor: Anthony DeVito
Department of Radiologic Technology

Abstract: Practicing radiation safety methods can reduce dose to both the patient and the radiographer. The purpose of this research is to evaluate dose absorbed on the surface of the patient's skin by analyzing the differences between the presence of a using a lead shield vs no lead shield. Also, to demonstrate that using a shield is effective in reducing dose. The test subject is a full body phantom, and the x-ray position is Abdomen AP KUB. All technical factors remained the same (40" SID, OID kept at a minimum, 85 KV, AEC. In the first radiograph, the pascal dosimeter was placed in the collimated light field under the shield, and in the second radiograph in the same area but with no shield present; The dosimeter was placed on the patient to observe dose. Collimation was 14"x17" for both radiographs. In the radiograph without the shield, the dose to the patient was 281.6 µgy and in the radiograph with the shield present, the dose was 5.062 µgy. There is a 55% reduction in dose when a shield is used. This research is useful in radiation protection and reinforces the importance of using radiation safety practices to reduce dose exposure.

Introduction: Radiation protection is the practice of incorporating time, distance and shielding to limit the radiation an individual receives at a given time. The purpose of this research is to evaluate the need for shielding during a radiograph of the abdomen.

Method: Position X-ray tube at 40 inches SID (Source to image distance), and 85 KVP medium adult technique was set. AEC was set with OID (object to image distance) kept to a minimum. A whole-body medium size adult phantom was used to represent the average adult. The phantom was positioned for AP Abdomen KUB to evaluate the kidneys, ureters and bladder. Exposures were taken at 14" x 17" collimation with shielding and without shielding the phantom, while using a dosimeter to measure the exposure dose. The first radiograph was taken with the dosimeter placed within the collimated field under the shield. Then another radiograph was taken with the dosimeter placed within the collimated field without a shield. The dose absorbed by the dosimeter was recorded for each exposure

Figure 2: Collimated light field over the anatomy of interest. The right marker at the bottom corner and dosimeter in the light field. No shield applied.

Results: When the shield was not applied the dose was 281.6 µgy and when the shield was applied the dose received was 5.062 µgy. The results concluded that when the shield was used, radiation was reduced. There was a 55% dose reduction when the shield was applied.

Conclusion: Shielding saves a great amount of radiation which can be harmful to the patient. We concluded , that when taking the radiograph without the shield present the dose was significantly higher. The dose administered to the gonads can be extremely damaging due to the technique used for abdominal X-rays . By adding the shielding 55 % of dose was attenuated by the lead and did not go to the patient. Attenuation is the overall reduction in the x-ray beam . Having shielding present attenuates majority of the x-ray beam. Without the presence of shielding the odds of radiation causing biological harm increases with every radiography taken without a shield. Shielding is beneficial and should be used for all radiographing imaging as long as it does not obscure the anatomy of interest.

Figure 1: Patient in supine position with x-ray tube positioned over abdomen at level of c4.

Figure 3: The pascal dosimeter in the collimated light field . The dosimeter is used to measure skin entrance radiation dose. No shield applied.

Figure 4: X-ray image of the abdomen without a shield. Dosimeter in the light field

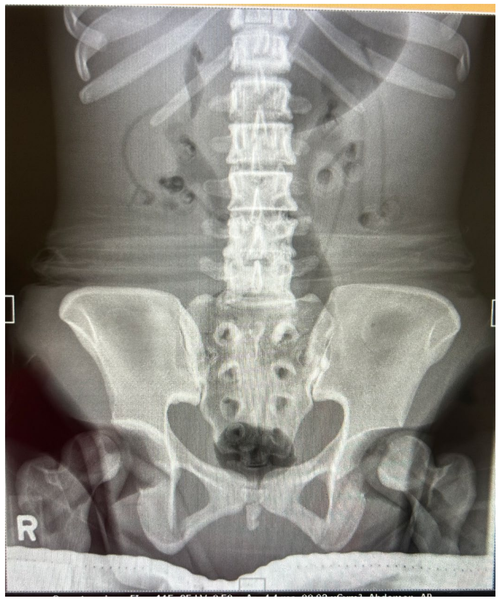


Figure 5: X-ray image of the abdomen with the shield applied.

Embedded Carbon Modeling

Mohammed Jalloh,
New York City College Of Technology
Mentor: Alexander Aptekar

Abstract

The evaluation is specific to the project location. We worked on determining the embedded carbon and ecological costs of different materials, also comparing traditional light wood frame construction to advanced design straw Bale construction. Start to looking up the different amounts of carbon that both materials would require and the distances suppliers to the site so that you can determine the transportation costs of the materials.

Introduction

The purpose of energy modeling in this context is to provide high-accuracy estimates of potential energy, cost and carbon savings for energy conservation measures under consideration.

Water prevention in a multi-family home

•smart vapor barrier/ air barrier to remove rising moisture
•extend roof to prevent bales and lime wash from getting wet (we also plan to raise the bales
•building roof on floor then craning it onto the house helps with compression

Major heat factor due to increasing temperatures ->
need to find energy efficient air conditioning be of predicted increase of number of days experiencing a heat wave.

Will experience 15 days above 97 degrees in 30 years. Electricity usage for cooling purpose as a result will increase by 21.50%

The energy model should incorporate site weather data for a typical year as well as detailed information about building geometry, building construction, systems, operations, and occupancy. The energy model will use this information to simulate the building's energy consumption for every hour of the year.

Method

Port Jervis is classified as a zone AE area, meaning there is an annual 1% chance of flooding and 26% chance of flooding over 30 years of a mortgage. Extreme risk of flooding, but deeper floods from major events (like hurricanes) are less likely to occur.

- **Solution: Elevate housing on podium**

Minor fire factor over the next 30 years due to increasing temperatures. -> some fire protection

- **Solution: fireproof insulation-straw**

Port Jervis Reservoir #3, about 7 miles away. Located in Deer park, the reservoir is north of 26-30 Jersey Ave.

Condition is marked as fair, meaning there are no evident safety deficiencies in the reservoir, but any rare or extreme hydrologic and/or seismic events may result in a dam safety deficiency. Since there are no fault lines under New York, seismic activity will be an extremely rare occurrence.

Details on podium design to mitigate flooding

Must Have breakaway walls and pillar shape should be rectangular

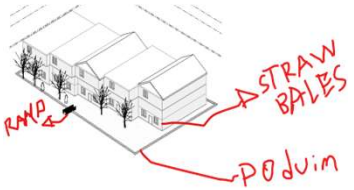
Literature review

Port Jervis has a good chance of flooding annually. More prone to deeper floods from major events like hurricanes. Due to the rise of global Warming, it has minor fire factor over the next 30 years. Major heat factor due to increasing temperatures is the cause that we need to find energy efficient air conditioning because of predicted increase of number of days experiencing a heat wave. Solutions to counter these problems such as Elevating housing on podium, fireproof insulation-straw are ways to combat these issues.

Conclusion

We have concluded that in order to counter our issues at Port Jervis regarding the flooding we produced the solution to elevate the housing on a 1 Foot Podium, adding that it must have breakaway walls and pillar shape should be rectangular. As regarding the toxic release of carbon onto the atmosphere and increased heat temperatures we produced the Instillation of Bale straw in the interior of the walls.

Results



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- https://msc.fema.gov/portal/home
- https://msc.fema.gov/portal/search?AddressQuery=26%20-30%20Jersey%20Ave%2C%20Port%20Jervis%20NY%2012771#searchresultsanchor

Development of Practical Method to Quantify Infiltration Rate Through Building Entrance

Ferasuddin Siddiqui, Louidelson Deguerre, and Steven Boodram
Mentor: Professor Daeho Kang

ABSTRACT

Infiltration has a large impact on the energy consumption of a building and indoor air quality. To that end, it is critical to understand the characteristics of the natural airflow through the building entrance that is one of the main sources of infiltration. While some studies conducted filed measurements, the impact of infiltration on building energy consumption and indoor air quality has not been well studied. This study aims to establish a comprehensive method to characterize such natural airflow in buildings. Literature review suggested that the differential pressure between the outdoor and indoor air affects the direction of airflow, along with the outdoor weather conditions. An effective method to help measure infiltration is trace gas method. Indoor temperature needs to be monitored to understand the air diffusion of the mixture throughout the lobby area. Given lack of such experimental studies, further study is required to accurately control air infiltration, which results in lowering buildings carbon footprint and maintaining comfortable indoor environment.

INTRODUCTION

Other than ventilation that we need to maintain acceptable indoor air quality, unwanted airflow through large openings such as windows and doors as well as cracks on the building envelop significantly affects building energy consumption, especially in winter. Energy loss due to infiltration is a large part of building energy consumption: 33% of energy used in residential buildings and 40% in commercial buildings. Air infiltration also has a significant impact on indoor air quality because it allows outdoor particles, gaseous containment and moisture inside. Stagnant air pollution research can provide important information on indoor and outdoor air pollution, informing us on strategies to minimize pollution's detrimental effects on human health and the environment. Accurate quantification of air infiltration rates through building entrance doors allows reduction of energy consumption, improvement of indoor air quality and better understanding of physical phenomena around the entrance doors.

METHODS

Trace Gas Method

- It can measure air flow rate and help determine air quality indoors.
- It is used to study movement of air pollution and its dispersion around buildings.

Blower Door Method

- It allows air infiltration rate to be measured by the pressure difference between the indoor and outdoor space.
- It is disruptive to the occupant because a blow fan is mounted to a door and it takes lots of effort to set up and tear down.
- It can't find where infiltration enters from and measures infiltration in a confined space.

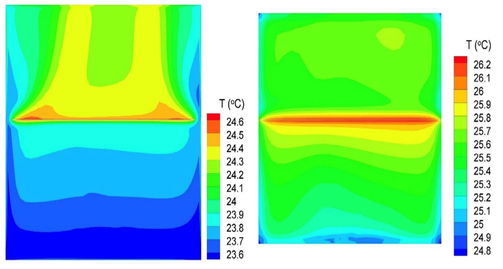

Figure 1. Temperature distribution on the wall with the crack: (left) outside surface and (right) inside surface. (Adapted from 2)

Thermographic images

- It along with blower door helps locate the cracks inside the building and the size of them which can help calculate inflation more accurately leading to better building energy consumption.
- Thermographic images of a building help identify crack sizes and infiltration rates. Infrared thermography can be used with the blower door method to identify the locations of building cracks as shown in Figure 1.

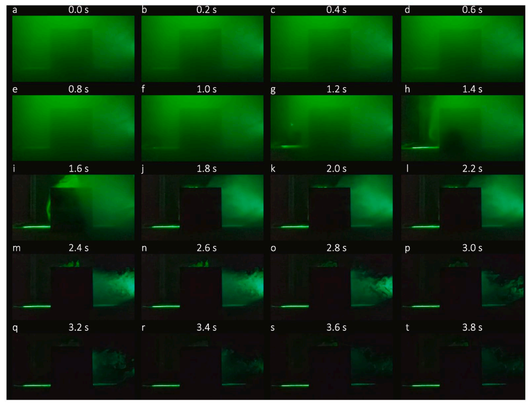

Figure 2. Flow visualization in the vertical center plane parallel to the wind flow from the side view. (Adapted from 5)

RESULTS

- Lie et al. (2018) proposed a novel technique to measure infiltration rates. The trial run in the building as shown in Figure 3 revealed that the proposed method only needed one person and a half day to complete the task. Additionally, compared to the conventional blower door method, the equipment used in this method is lightweight and simple to install.
- The trace gas modeling the air pollutant was stuck around the building model, exposed to boundary layer wind flow. It was also understood that stationary air pollution protects against the wind behind a building where air flow is disrupted, leading to an increase of air pollutant exposure time compared to the windward and side face.
- The wind took more than 1.0s (f) to pass through the upstream section of the test section and reach the trap compartment, as shown in Fig. 2. The smoke, as the model of air pollution, was then removed from the windward region of the building model in just under 0.6s (g-i), then it remained only in close proximity to the windward face for a bit longer (g- l).
- Using a thermographic image of a building envelope taken by an infrared camera and measuring the indoor/outdoor air velocity, temperature, and pressure helps identify crack size and air infiltration rate.

DISCUSSION

Air pollution is a major urban issue that affects people who live in and near cities. Infiltration has a significant impact on indoor air quality because it allows outdoor particles, gaseous containment and moisture inside. Further research is needed to effectively quantify the infiltration rates through building entrance doors. As key factors affecting infiltration rates are identified, a detailed plan for field measurements, including all the instruments should be established. Differences in the infiltration rates through different types of entrance doors and the existence of vestibules need to be investigated.

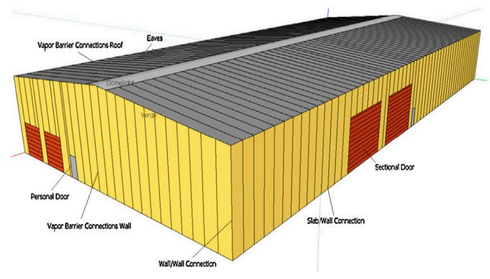

Figure 3. Relevant leakage of building component and connection of the sample building. (Adapted from 3)

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Developing a Method to Study to Examine Lookism on Social Media

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Introduction

"Lookism" is a term to describe appearance discrimination or "the practice of discrimination on the basis of physical appearance in the workplace" (Ghodrati, Joorabchi, & Muati, 2015, p.1). In popular literature, it has been called "beauty prejudice" (Etcoff, 1999, p. 1). The notion that a pleasing appearance results in favorable outcomes (e.g., higher wages, promotions) from others is not necessarily new, as literature on physical attractiveness is rather extensive. The Washington Post Magazine first used the term "lookism" in 1978 (e.g., Ayto, 1999), however, the term "lookism" was first recognized as a form of discrimination by authors of the Oxford English Dictionary and American Heritage Dictionary in 2000 (Ghodrati et al.)

Purpose of Research

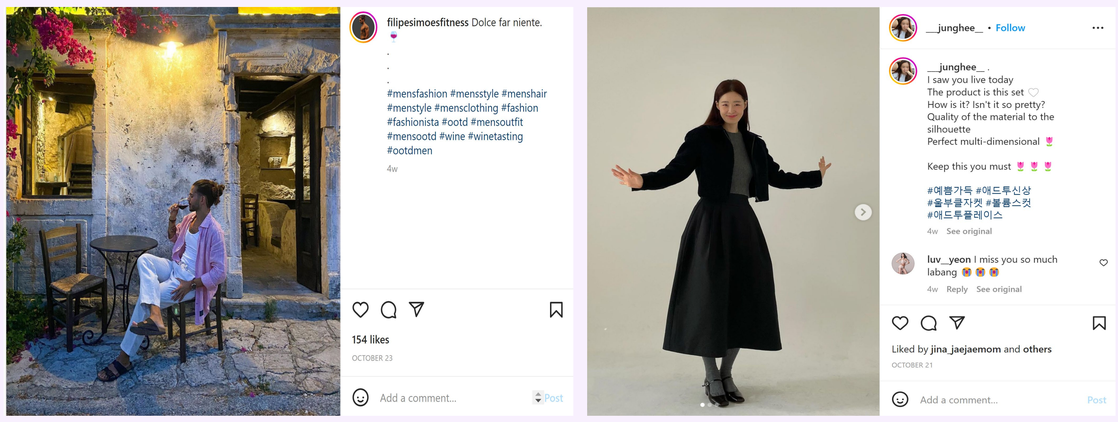
Research is needed for clarity to combat the issue of lookism and ethnicity, particularly as it is expressed on social media. Scholars in the apparel and textile field are positioned to make significant scholarly impact on this topic. The *purpose of the research* is to assess a method to examine lookism that may exists on social media. Assessing lookism on social media can provide awareness of the issue and prompt future longitudinal studies demonstrating any increases or changes in the issue. The objectives of this paper were to: 1) provide a method of analysis of social media as it pertains to lookism; 2) present preliminary findings from a pilot using the developed method

Theoretical Framework

Stone (1962) outlined the concept Symbolic Interaction process called whereby individuals use dress to state their identities to others. Stone noted an individual is recognized as having an identity when the identity is claimed by the individual, often using dress, and when others attributed the identity to the individual. Although the association of an item of dress with any one gender versus another is dynamic and changes over time (Tortora & Marcketti, 2015), customarily there have been specific dress items and practices (e.g., wearing neckties, shaving legs) that have been adopted almost exclusively by either males or females (Tortora & Marcketti). Thus, individuals could easily use dress to infer a corresponding gender identity. During the 2010s, the idea that other genders might also be symbolized in appearance emerged with the promotion of non-binary1 dress (Mackinney-Valentine, 2017). Non-binary dress refers to dress that can be worn by anyone at any time (e.g., t-shirts, jeans) and are designed to avoid creating specific distinction.

Methods

Methods: A qualitative content analyses of social media images were used to address the research question. Social media aspects examined included: i) dress ii) hair style, iii) position, iv) context, v) definitions of lookism, vi) facial feature, and vii) number of likes. The content analysis was completed twice by two separate researchers to established interrater reliability. The interrater reliability was above 90%. The initial sample included images selected from a personal Instagram account. The sample included ten images with a Caucasian model and ten models of other ethnicities (e.g. African America, Asian, etc.). The data were analyzed for repeated themes. Each theme was coded and reanalyzed to develop the themes.



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Mackinney-Valentin, M. (2017). *Fashioning identity: Status ambivalence in contemporary fashion*. Bloomsbury Publishing.

Literature Review

Lookism can be influenced by a number of appearance cues, such as visible demographic traits (e.g. race, gender, age), body size, and clothing. The influence of appearance on others has been noted, particularly race, gender, and age. The United States has a variety of races, ethnicities, age groups, and cultural backgrounds where researchers found racial discrimination, persistent anti-foreigner racism, and racial/ethnic taunting of Asian American college students (Cheng, et al., 2017). Steele (2016) investigated colorism as a pressing issue in U.S. society. Children's media was examined. Lookism related to skin tones was found. Bullies were depicted with a deep blue skin tone, which signified their skin's blackness. The correlation between wealth, education and ethnicity revealed patterns of prejudice against African Americans with darker skin tones.

Social media is the primary promoter of lookism, particularly among youth. It repeats images of beauty standards whereby the viewer becomes obsessed with achieving these standards and influences the adoption of beauty biases (Yoobin & Minyoung, 2022; Mason, 2021). Rhodes (2010) discussed cultural injustices of being unattractive in a society appearance obsessed with the potential for "looks" to influence hiring practices, such as better career options and higher pay. Those who feel unattractive in an appearance laden society could suffer certain mental health issues potentially causing anxiety, anorexia, and depression. In addition, lookism can emerge in social media because there are fewer social barriers to communicating with strangers online (Mason, 2021).

Related theoretical frameworks to this topic include Stone's (1962) concept of Symbolic Interaction called whereby individuals use dress to state their identities to others. Stone noted an individual is recognized as having an identity when the identity is claimed by the individual, often using dress, and when others attributed the identity to the individual.

Results

After analyzing the initial 20 photographs, the process was evaluated. The main issue focused on selecting photographs to analyze. Therefore, the researchers examined social media pages and found analyzing the social media sites (Instagram) of fashion companies was a professional, focused source of images. These sites had a consistent set of images for systematic selection. Other parameters in selecting images included recent photographs, reachable through "#Company Name," and a large pool of photographs of individuals wearing the clothing from the business that allowed for random selection of images.

The preliminary analysis of the 20 images demonstrated some patterns that may be insightful to understand lookism and social media. Ten photographs were Caucasian and 10 were "other." The "other" group had five black models, two Hispanic, two Asian, and one Middle Eastern. There were five females and five males in each group. The photographs with the most likes tended to feature women in tight fitting, revealing clothing or me. The female had the most likes among the Caucasian group (n=8,148 likes). She was dressed in a tight-fitting t-shirt that revealed her stomach. However, she was wearing loose-fitting, casual pants. Another photograph that was liked (n=166 likes) more often in the Caucasian group featured a woman with a heavy coat, jeans, and a hat. The photograph with an African American was the most liked (n=1665 likes) female in the other category. She was wearing a tight-fitting, low cut, short dress. Her clothing was very body revealing when compared to the clothing worn by the photographs with the most likes in the Caucasian group. Interesting cultural dress was liked (n=775 likes) among the female pictures in the "other" group.

The photographs featuring males (Caucasian and other group) tended to wear business casual outfits. The photograph with the next most likes (n=3042 likes) in the "other" category was an Asian man dressed in an oxford shirt and dress pants. He had short hair, neat hair. He was dressed more professionally than the Caucasian male pictured in the photograph with the most likes among other Caucasian males (n=1147 likes).

Conclusion

Discussion, Conclusions, and Suggestions for Further Research: Lookism has been particularly common recently. Social media has been influential in perpetuating lookism, particularly among the young (e.g., Yoobin & Minyoung, 2022). Researching lookism in social media can uncover biases that may exist in society related to diverse demographic groups (e.g. age, disability, gender, ethnicity, etc.). This pilot study examined a method to research social media and lookism. After examining 20 images on social media, the content analysis was helpful in determining potential lookism that might exist. The researchers propose defining the specific parameters of image selection. In addition, the number of likes might be influenced by when the images were posted. Therefore, relatively new (posted within the last month) should be selected. Future research can examine lookism among social media of different fashion companies (e.g., fast fashion brands). The preliminary results demonstrated some biases by gender. Males tended to be presented professionally, while non-white females were presented in a sexual manner. Further study can examine the presentation of females, males, and ethnicity in photographs on social media. The research is important theoretically, contributing to Symbolic Interaction Theory. It also has the potential to address and bring awareness to the issue of lookism and identify the appearances (e.g. females and revealing clothing) that might result in lookism.

Database Migration: Lost in Translation

There are complex data storage and communication solutions in the modern data-driven world. The solutions influence all fields that work with data. Those that work with data work within the limitations and challenges data management presents.

01

Introduction

Many organizations store volumes of data in relational databases of different designs and make. Now that large data sets are becoming more accessible to researchers and the public in general, those interested in available data would want to import and look at data for more efficient data analysis or improved data accessibility. There are many methods of data storage and data exchange. Unfortunately for all involved, there is no sing broad solution that provides a satisfactory solution for all situations. This is even more prevalent as data can vary depending on topic (financial, census, scientific, etc.), volume, and a multitude of other characteristics. This study is essential as access to database tools allows individuals and small businesses to leverage databases and data analysis regardless of scope. However, this study finds that further research should emphasize the best or most common analysis strategies upon deployment of a DBMS.

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Acknowledgement

Research Mentor:
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Department of Computer Systems Technology

02

Objectives

This study aims to understand better and communicate the challenges of storing, migrating, and collating data. There are Three objectives in this process to better the challenges found:

- Investigate and provide a view of two database migration methods.
- Overview historical research into database migration and its logistical problems.
- Highlight challenges for database migration and their potential solutions.

03

Methodology

As this study consists of two distinct sections, one on a practical approach to database migration, and one theoretical, this section is devoted to describing the steps taken, and the challenges faced in the practical approach.

The steps include:

- Finding a database or a set of databases
- Choosing a Database Management System (DBMS) that is best suited for transfer
- Transfer the DBMS data using automated migration software
- Transfer the DBMS data through manually replicating the Database's schema and manually exporting data

06

Conclusion

Database migration is a complex process where many factors influence decision-making. Ultimately, a combination of DBMS software, database organization, and database requirements influence the steps taken. However, this study can only point out the two most prominent concerns of one particular database implementation. As machine learning becomes increasingly prevalent in many workflows, future research should use the technology to explore AI-augmented database migration.

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Figures

Figure 1: *DB Browser for SQLite* Screenshot https://sqlitebrowser.org/ Accessed: 04/25/2023

Figure 2: *Microsoft* SQL Server 2019 https://www.microsoft.com/en-us/sql-server/sql-server-2019 Accessed: 04/25/2023

Figure 3: *National Transportation Safety Board* eadmspub.pdf https://data.ntsb.gov/avdata Retrieved: 04/25/2023

Figure 4: National Transportation Safety Board eadmspub_legacy.pdf https://data.ntsb.gov/avdata Retrieved: 04/25/2023

04

Challenges

Challenge 1: **Choosing a Database Management System to Migrate To**

Different DBMS' provide different benefits to users and administrators. Key characteristics of DBMS for consideration are:

- Compatibility with previous database
- Available tools for migration or ease of access
- Accessibility (support from users, software requirements; is availability required during transition?)
- Provides, at least, the same functionality as the previous system (database availability, scalability)
- Hardware requirements (is remote functionality required?)

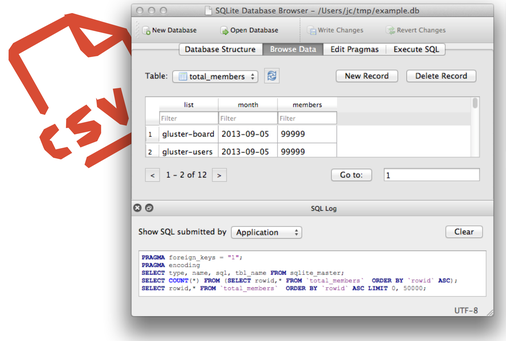

FIGURE 1 (LEFT):
DB Browser for SQLite
- Simple GUI interface
- Extensive documentation of SQLite
- Can import from CSV or SQL files

FIGURE 2 (TOP RIGHT):
Microsoft's SQL Server 2019
- SQL based
- Extensive first party documentation and Administrator Communities
- Migration tool to handle data transfers

Challenge 2: **Database Schema Consistency and Merging**

As database schemas change over time to account for better organization or new data input, databases look different depending on its purpose and over time. Therefore, replicating a database consistently requires an understanding of the underlying schema. In a practical example, the following are two databases schema that have been used by the National Transportation Safety Board in their databases recording investigated incidents and accidents.

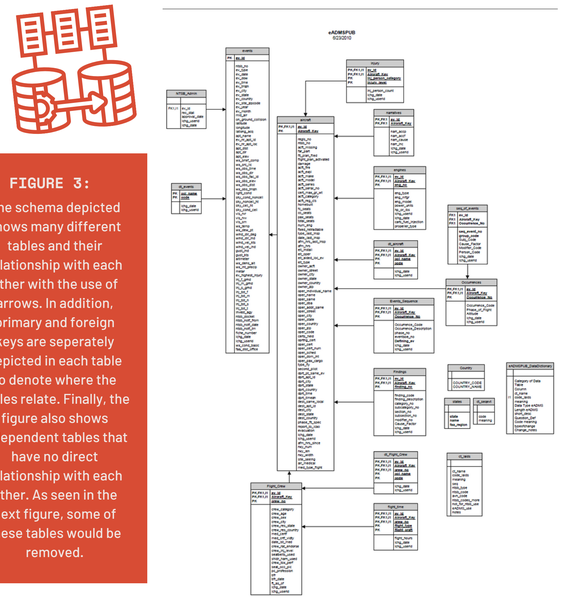

FIGURE 3:
The schema depicted shows many different tables and their relationship with each other with the use of arrows. In addition, primary and foreign keys are seperately depicted in each table to denote where the tables relate. Finally, the figure also shows independent tables that have no direct relationship with each other. As seen in the next figure, some of these tables would be removed.

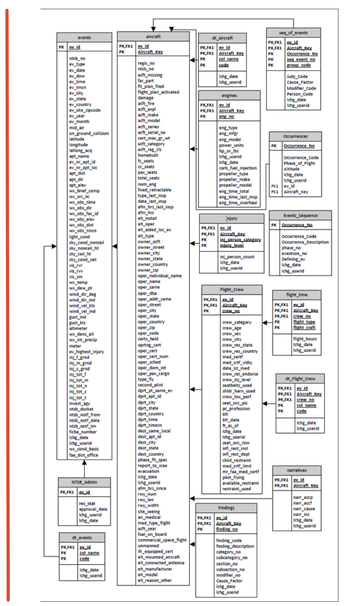

FIGURE 4:
This schema represents contemporary information on accidents and incidents investigated by the NTSB. The number of independent tables have been reduced to one reducing independent variables. The schema also shows that certain tables have maintained the same structure through the change. For example, the table events has the same number of fields and the same names for those fields. Despite their similarities, joining two databases using these two schema would require removal or addition of tables that no longer exist in the new format.

05

Findings

The two major challenges presented provides an overview of the challenges faced by database users and administrators:

- Choosing a DBMS that eases transition is key in the process of migrating databases, however, a perfect match might not be possible.
- Tools available for database migration can reduce the workload of database users when transitioning between software.
- Depending on the purpose of the migration, different databases with different schema may be joined during the migration process. This can lead to missing or incorrectly formatted tables.

Given these challenges, a general process for database migration can be as follows:

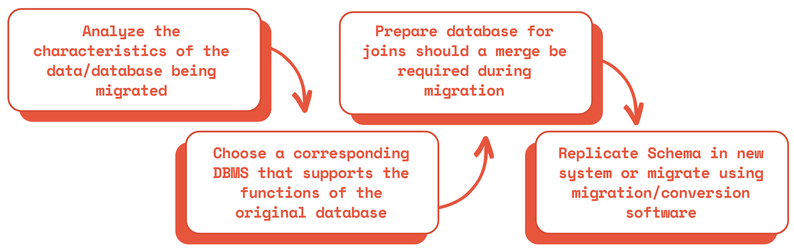

Figure 5: General Process for Database Migration

Developing a method for X-ray multi-energy output by valence electrons in alkali halide filters

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ESP Scholars: Zuonie Ke , Sabina Rakhmatova (Both from Applied Chemistry)

Mentors: *Subhendra Sarkar; Eric Lobel (Both from Dept of Radiologic Technology & Medical Imaging)*

Abstract

This work extends the inelastic x-ray scattering by Compton effect from individual atoms to simple molecules with electrons available in molecular valence orbitals. We started with the theory of Compton type angular scattering by individual alkali and halogen atoms and observed anomalous scattering results from alkali halide salts with molecules arranged in regular halide lattices. We are modeling the results in terms of two novel concepts, that may be named as “Compton Harmonic Generation” and “Compton Steal” and are presented in this work.

Background & Hypothesis

A X-beam machine resembles a camera that permits specialists to see what is happening inside a patient without performing an invasive medical procedure.

An extremely concentrated beam of electro-magnetic waves, known as X-ray photons is produced by an X-ray machine to produce an X-ray image.

History:
After passing through the air and tissues in our bodies, this beam creates an image on a metal film.

The high-energy rays pass through soft tissue like organs and skin because they cannot absorb them. The radiation is absorbed by dense body parts like bones. The X-ray film develops in accordance with the areas that were subjected to the X-rays, just like camera film.

An X-ray's black areas indicate areas where the radiation has penetrated soft tissues. Where denser tissues, like bones, have absorbed the X-rays, white areas appear.

Modern x-ray machines like the one used in our experiments (Hologic Mammography machine) is a digital computerized system. This system allows for more analysis of the output image beyond black, white and grey appearance.

One of the main types of photon interaction is the Compton effect, also known as the Compton scatter. It is the primary factor that causes a material to scatter radiation. It occurs when the photon interacts with free electrons or electrons in the valence shell that are not tightly bound.

The electron receives energy from the scattered incident photon that results. The energy of the scattered photon will be different because it will have a different wavelength. This procedure conserves momentum and energy.

The Compton effect is a process of partial absorption that occurs when the original photon loses energy known as the Compton shift. 0.024 (1-cos), where is the scattered photon angle, can be used to calculate the wavelength change of the scattered photon. Subsequently, the energy of the dissipated photon diminishes with expanding dispersed photon point.

Alkali Metals are metals in Group 1 of the periodic table. The two that are analyzed are sodium and potassium with the following properties:

Element 11: Na Atomic mass: 22.9898

Edge	keV	A
K	1.0721	11.5646

Element 19: K Atomic mass: 39.0983

Edge	keV	A
K	3.6074	3.4369

In this experiment we will be studying the interaction of four salts with X-ray. Nacl, KCl, NaBr and KBr. Ionic salts are made up of a variety of metals and nonmetals with varying atomic numbers. Additionally, the sizes and shapes of these salt crystals vary.

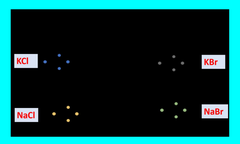
These crystals' orbital electrons and shapes will absorb and scatter various photons from our x-ray beam, resulting in an image on the x-ray machine's image receptor. In certain areas known as "Regions of Interest" (ROI), further analysis of the x-ray image could be done. These ROIs can be used to get and analyze the mean, standard deviation, maximum, and minimum values. The salts can be seen to absorb and scatter light through these analyses.

Method and Materials

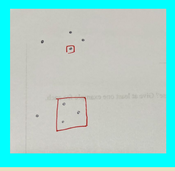
Materials:
Hologic mammography machine
NaCl, KCl, Nabr, Kbr
Paper, paper plates
Sponges, foams

Method:

- The salt was arranged on the receptor plate in several arrangements. One such arrangement is shown in the diagram below.. The collimation was set to a 15 cm x 15 cm exposure field.



- Images were taken at the following exposures: 20 kVp and 4 mAs, 20 kVp and 16 mAs, 25 kVp and 4mAs, and 25kVp and 16 mAs. No Grid. Rh, Al or AG filters were used either.
- The Mean, Standard Deviation , Minimum values, and Maximum values of a 128 pixel square ROI was recorded for each salt. A map of the ROI is shown below.



Results

Many arrangements and combination of salts were used for several exposures at the different exposure factors. Typical Recording of results are highlighted here.

Table 1 (Left) : The result of the data of exposing crystal salt. Table 2 (Right): Typical Analysis of X-ray wavelength based on Energy of X-Ray beams and Unit Cell Dimensions for Salts used.

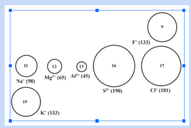
X-ray energy (keV)	λ. (A) and in (pm)	Salt Used	Unit Cell Dimension (A) Ref 2
5	2.48 (248)	NaCl	5.66
10	1.24 (124)	KCl	6.38
15	0.83 (83) x8=6.6	NaBR	5.96
20	0.62 (62) x10=6.2	KBr	6.68

Table 3: Typical nalysis that was done on the experimental data from the salt absorption/scattering experiment. The single grain flux that passes through the thickest region of the grain in comparison to the total background flux is depicted in blue, and the ionic electron numbers are represented by the color red. For instance, 58 of the 77 photons from the incoming beam that were present in the initial entry passed through the KCl grain. The remaining clusters will then be the subject of additional analysis.

20kVp/4mAs/Rh filter/Small Focal Spot	20kVp/16mAs/Rh filter/Small Focal Spot	20kVp/4mAs/Rh filter/Small Focal Spot	20kVp/16mAs/Rh filter/Small Focal Spot
58/77/ KCl 18,18 e-	88/150/ KCl	56/78/ KBr **18,36**e-	62/155/ KBr
59/77/NaCl **10,18** e-	79/150/ NaCl	55/78/ NaBr **10,36**e-	61/155/ NaBr

Discussion

Ionic radii of ions in alkali halide salts used (in pm)



Discussion (cont'd)

Recall Compton scatter involves the production of scattered x-rays of relatively high energies (relative to k-edges and l-edges) from high energy x-rays in the primary beam.
The x-ray beam is attenuated by mostly Compton and photoelectric interactions. Minimum readout value and maximum readout value within an ROI with a salt (compared to air shots) are important in our experiments. The min values indicate the pixels with the maximum attenuation. The max values (as increased from air shots) indicate scattered x-ray photons reaching a certain pixel or regions of no attenuation (if no relative increase from air shots).

Interference and Harmonization
When two or more waves superimpose (occupy the same point or points space at the same time), the interference can be constructive or destructive. The result could be a wave of higher energy (in phase), of lower energy (slightly out of phase), and wave moving in a different direction or no waves (total annihilation of both waves– destructive interference).

Crystal ionic salts have a regular lattice structure. The electronic arrangements create tunnel like structures with which one or more x-rays can harmonize. Even if no energy from the x-rays are absorbed by the salt, more than one x-ray can harmonize to produce a single ray. This results in fewer x-ray photons exiting the salt that have not undergone a photoelectric, Compton or elastic interaction. However, this interaction attenuates the beam. In our research we refer to this as “Compton Harmonic Generation.”
The Energy levels of the x-rays, depend on the frequency and wavelength of the wave. This wavelengths are theorized to have a relationship to the bond length and the atomic radii. We were unable to measure wavelength during our experiments.

Scatter radiation should increase the number of photons reaching our detector elements (hence affecting the readout at our pixel). Hence, any ROI reading outside of our salt should either maintain the same Min-max value or show a slight increase in these values due to the scatter (relative to air shots). However, some decreases were observed. This may be due to scattered x-rays interfering with x-rays in the uncovered ROI. In theory, the Compton scattered photons could either destroy some beams or at least change their direction. This means that our salts were able to attenuate parts of the x-ray beam without being in the direct path of these x-rays. It is the Compton scatter that facilitated salts to effectively ‘steal’ these x-rays from the underlying DELS (or pixels) so we refer to this as “Compton Steal.”

Conclusion

This series of experiments is continuous and further analyses and modifications are being done to obtain more precise results.
Detailed analyses of the behavior of x-rays on alkali metals, particularly sodium and potassium. This important because sodium and potassium are vital in muscular activity. Their presence in muscles like the heart is at a very high concentration, especially in the infant heart. Further experiments on these elements may therefore lead to better application of radiography in diagnosing conditions involving the metabolism of these vital minerals
i.e. Cancers, conditions of the heart and muscles – cardiac attack in an ER.
There are other non-medical fields in which our experimental results may be also be applied, e.g. scanning for aircraft defects.

Acknowledgment

- We would like to acknowledge valuable help from Dr. Subhendra Sarkar, Professor Douglas and Professor Lobel.
- Undergraduate Research at Citytech
- LSAMP

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Importance of Diversity in Computer Science Industry

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Department : Computer Systems

Abstract

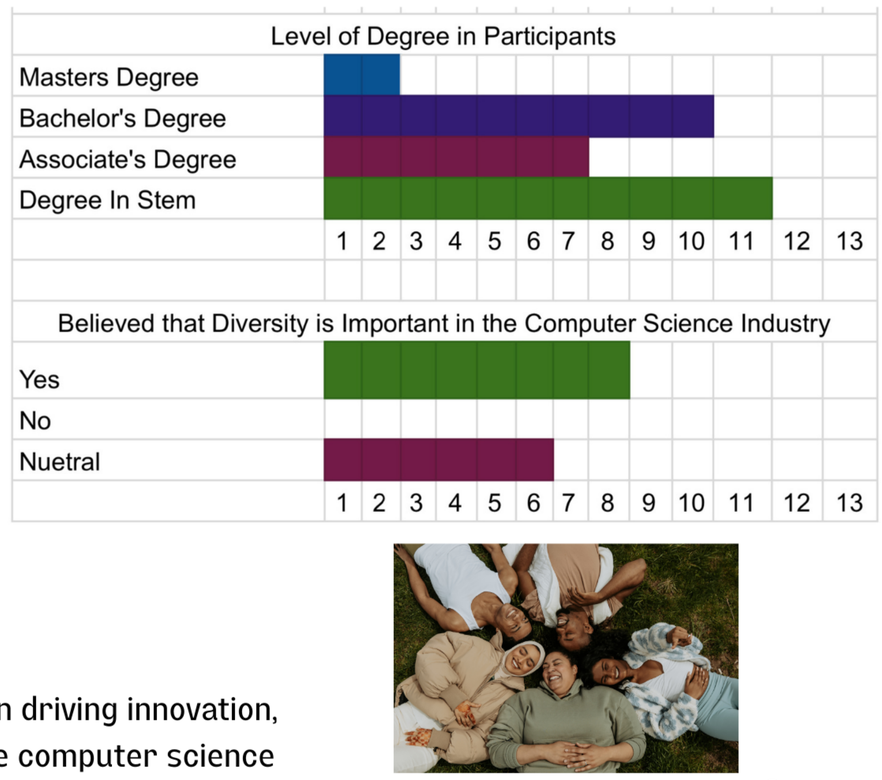
Diversity has become a buzzword in the technology industry, and for good reason. The computer industry has been known for its lack of diversity. This lack of diversity poses a significant challenge, as it can hinder innovation and limit the industry's potential for growth. The objective of this research is to uncover the reasons why diversity is so crucial in the computer science industry. I used surveys to investigate the importance of diversity from inside and outside of the computer science industry. I also conducted surveys for professionals at different levels in the industry. I also completed thorough research through CUNY colleges to find which colleges have diversity in their computer science departments. The data suggest that diversity has significant advantages within the computer science industry including innovation. With a diverse group of employees , companies can atop into a broad range of ideas and perspectives, leading top the development of new and unique products and services. Additionally, diversity can lead to better problem-solving skills and more efficient decision-making, as a team with diverse backgrounds can offer a variety of viewpoints and approaches to solving problems. These conclusions are more detailed than those in the past because it shows the potential top address the industry's existing biases. Unconscious bias can impact recruitment, hiring and promotion practices within the technology industry, leading to a lack of diversity within the workforce. By actively promoting diversity, companies can counteract these biases and create a more inclusive work environment.

Introduction

Diversity has been a topic of discussion in the technology industry due to the lack of representation within the field. This study aims to identify the significance of diversity in the computer science industry by investigating the perspectives of professionals at different levels within the industry, as well as those outside of it. Using surveys and research conducted through CUNY colleges, the study found that diversity plays a critical role in driving innovation, problem-solving, and decision-making in the industry. The research indicates that having a diverse workforce can lead to a wider range of ideas and perspectives, resulting in the development of unique products and services. Furthermore, promoting diversity can address existing biases within the industry and create a more inclusive work environment. This paper provides a detailed analysis of the advantages of diversity in the technology industry and emphasizes the importance of addressing the issue of underrepresentation.

Method

- Survey of students
  - Ages 18 - 42
  - High school diploma - Masters Degrees
  - Black, Hispanic, Multi-Racial, Caucasian
- Survey of Educators
  - Professors of universities
  - High school teachers
  - Middle school teachers
  - Black, Hispanic, Multi-Racial, Caucasian
  - Bachelors Degrees - PhDs
- Research through accredited websites
- Advice and conferencing with mentor



Literature Review

Recent studies have highlighted the significant economic potential associated with increasing the ethnic and gender diversity of the U.S. technology workforce. The underrepresentation of African American and Latino/Latina workers in the tech industry, along with women, has been identified as a challenge for the industry. According to the National Academies of Sciences, Engineering, and Medicine, the representation rates for computing occupations are smaller than those reported for the tech industry as a whole, which presents a considerable opportunity to expand the industry's diversity. The report highlights the need for addressing the lack of diversity in the computer science and information technology sectors to realize the full potential of the tech industry and create opportunities for jobs and improvements in products.

Results

The survey results suggest that there is widespread agreement among participants on the importance of diversity in the computer science industry. This agreement is significant because it suggests that there is a growing recognition of the value of diversity in this field. Furthermore, the finding that most participants have a degree in STEM highlights the relevance of diversity within STEM fields, and the need to address issues related to underrepresentation of marginalized groups in these fields.

The survey results also indicate that individuals from diverse racial and ethnic backgrounds were among those who voted "yes" for the importance of diversity in the industry. This is noteworthy because it demonstrates that the recognition of the importance of diversity in the industry is not limited to individuals from marginalized groups. Instead, it is a shared belief among individuals from diverse backgrounds, indicating that diversity is a critical issue that affects everyone in the industry. These findings provide valuable insights into the attitudes towards diversity in the computer science industry, and they highlight the importance of promoting diversity and inclusion initiatives to ensure that the industry can fully realize its potential

Conclusion

IIn conclusion, diversity is an important factor in driving innovation, problem-solving, and decision-making within the computer science industry. The research shows that having a diverse workforce can lead to a wider range of ideas and perspectives, resulting in the development of unique products and services. Moreover, promoting diversity can address existing biases within the industry and create a more inclusive work environment. The study highlights the need for addressing the lack of diversity in the computer science and information technology sectors to realize the full potential of the tech industry and create opportunities for jobs and improvements in products. The industry report discussed in this research suggests that increasing the ethnic and gender diversity of the U.S. technology workforce can add billions of dollars to the tech sector and support the creation of jobs. The importance of diversity in the industry is recognized by individuals from diverse backgrounds, and it is a critical issue that affects everyone in the industry.

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Professor E. Milonas. Ph.D and Survey Participants.

Green Roof Media Parametric Study

Student Researcher: Yehya Elfgeeh

Faculty Mentor: Ivan L. Guzman, PhD, P.E.

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Abstract

Green roof farms have contributed to deliver the benefits of the suburban environment to the urban setting. By installing green roofs, commercial buildings can reduce the amount of energy needed to heat/cool the building. However, existing buildings have a limited capacity to withstand the additional loads imposed by a green roof which include green roof infrastructure, growing media, and vegetation. These additions need to be light weight, so buildings can carry them without adversely affecting the structure. Adding repurposed textile to lightweight engineered soil can modify the hydrogeological properties of the soil without compromising its weight. The project focuses on adding recycled textile to green roof media (soil), and studying its effect on the properties of maximum media density (MMD), water content and hydraulic conductivity of the host soil. In previous findings, adding textile fabric (3% by weight at an aspect ratio of 1:1) to lightweight engineered soil resulted in a significant change to the hydrogeological properties of the host soil. During the ongoing study we are mixing lightweight engineered soil with similar repurposed textiles at an aspect ratio of 4:1 and recording any changes in said properties. The effects of aspect ratio on hydrogeological properties will be documented and compared to previous findings as part of a broader parametric study

Methodology

Day 1:

1. **Percent textile by weight (1.0%, 2.0%, 3.0%, 3.5%) at an aspect ratio of 4:1 (2' x 0.5") were added to the soil.**
2. **Soil was then compacted in one layer with 6 blows using a Modified Proctor Hammer.**
3. **Soil specimens were submerged in a bath for 24-hours with weighted steel plates to prevent soil from swelling.**

Day 2:

1. **After 24-hours soil specimens were placed on wood stands to drain for 120mins. At which time, the Maximum Media Density (*MMD*) was recorded. MMD is the weight of the soil used in dead load calculations during a structural analysis.**
2. **The water permeability at MMD (k_{mmd20c}) was determined by conducting a Hydraulic Conductivity Test.**

Day 3:

1. Soil was transferred into aluminum pans and placed in an oven to dry at 220-250 °F for 24 hours.

2. The weight of the specimen was measured after taking out of the oven and the moisture content *(w%)* was calculated.

Results

The results show that the addition of recycled textile at the levels tested, significantly increased the soils moisture content by approximately 30% (49 percent change), without compromising the soils weight. This has the effect of increasing the amount of water available for plant growth, thus, potentially reducing the amount of required irrigation in a commercial roof farm. The other parameters evaluated, MMD and permeability, did not change significantly due to the addition of textiles in the quantities tested herein.

	Specimen (%Tex)			
	1%	2%	3%	3.5%
MMD (pcf)	76.83	76.20	82.94	78.07
$K_{mmd20c\ (in/s)}$	$2.34X10^{-3}$	$3.31X10^{-3}$	$1.8X10^{-3}$	$2.02X10^{-3}$
Moisture Content (%)	72.36	72.82	81.69	90.9

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