



Book of Abstracts

**The Louis Stokes Alliances for Minority Participation
Program**

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Machine Learning Method to Analyze Criminal Data

Kiyatou Konate & Ida Touray
Prof. Marcos Pinto

Machine learning are a set of programatic tools used to analyze huge amounts of data, so called big data. These tools enable systems to process, learn from, and draw actionable insights out of big data. Some of these tools are powerful algorithms used to spot patterns in data and make predictions about future events. One of the areas that machine learning has been employed is people's personal safety through the analysis of criminal data over a certain geographical region. Law enforcement officials have turned to data mining and machine learning to aid in the fight of crime prevention and law enforcement. This project applies machine learning algorithm to a dataset of criminal activity to predict and act against criminal activities and potential security risks. The project is done using Python programming language and its array of libraries proper for machine learning. The dataset is obtained from the University of California Irvine (UCI) Machine learning Repository-Communities and Crime Data Set.

Computer Vision–Face Detection

Sumya Raha
Prof. Marcos Pinto

The primary aim of face detection algorithms is to determine whether there is any face in an image or not. It is a part of object detection and can be used in many areas such as security, bio-metrics, law enforcement, entertainment, personal safety, etc. Faces must be detected with all manner of orientations, angles, light levels, hairstyles, hats, glasses, facial hair, makeup, ages, and so on. The algorithms must be trained on huge datasets containing hundreds of thousands of face images and non-face images. Once trained, the algorithms can answer two questions in response to input in the form of an image: are there any faces in this image? and, if yes, where are they? If a face or faces are present in an image, the algorithms will answer these questions by placing abounding box around the detected face(s). The project will use the Viola-Jones algorithm, one of the most important algorithms for face detection, which uses a fast detection method that slowly detects a face through a computation of matching faces proportions in an image.

Network Centrality Measures and Network Capacity

Luc Telemaque
Prof. Nadia Benakli

Many real-life applications, including networks, are represented by graphs. Some examples of networks include: The World Wide Web, The Internet, Citation Networks, Biological Networks, Social Networks, and Transportation Networks. We are interested in the following two questions:

1)When and how to term a node of a(social) network important?

2)How can we manage the flow in a (transportation) network to maximize efficiency?

To answer the first question, we learn about centrality measures. To answer the second question, we study network capacity.

Environmental Mapping Robot

Caren Yang

Prof. Farrukh Zia

Design, build and test a small mobile robot, programmed to explore and map its environment by using an intelligent search algorithm. Several sensors such as InfraRed sensor and Ultra Sonic sensor are used to detect different type of objects and obstacles in the path of the robot.