Engineering and Computer Science

Hilario Balajadia, Jr
Load-balanced Middlebox Algorithms in Dynamic Cloud Data Centers
Faculty Mentor: Bin Tang, Computer Science

Due to the increasing connectivity between different machines through different servers and switches, middleboxes (MBs) have become very influential in system design. MBs are used in systems to add another layer of security to the system (firewalls) or reduce the distance of connectivity between two machines (load balancing).
In this work, we study the load-balanced MB algorithm in dynamic cloud data centers wherein different communicating virtual machine (VM) pairs have different communication frequencies. We show that this problem can be solved by a minimum-cost flow model. We further design three different ways that MBs can be assigned: (1) priority of the numerical order of the machines that are connected to each other (VM based) (2) priority of the middle boxes and their capacity (MB based) and (3) a method that combines both of these to deliver the smallest cost of each instance while also controlling the capacity of each middle box (VM+MB based). We show that the minimum cost solution performs the best among all the load-balancing MB algorithms."

Jacob Collette, Fernando Ochoa, Hector Cabrera
Processing High Density Images Via Artificial Intelligence
Faculty Mentor: Amlan Chatterjee, Computer Science

Tests were conducted to develop a Deep Neural Network that could operate under the assumption that images could be of high density and contain a high number of misleading features, in order to simulate a damaged or broken physical sensor.

Fernando Ochoa, Hector Cabrera, Jacob Collette
Exploring Graph Compression Using Convolutional Neural Networks
Faculty Mentor: Amlan Chatterjee, Computer Science

Many network data sets can be represented by using an adjacency matrix, allowing for the use of image representation with the help of Java. Some types of networks such as Road Networks, Social networks, and peer-to-peer networks all represent real-life interactions and relationships that are growing at an exponential rate thus begging for new means of picking out and understanding the important parts of the data. Finding similarities in the images representing the data sets can lead us to new ways of compressing and dealing with the ever growing size of big data.

Hector Cabrera, Jacob Collete, Fernando Ochoa
Detecting Patterns In Big Data Graphs
Faculty Mentor: Amlan Chatterjee, Computer Science

From images acquired by randomly generated graphs we used a CNN to be able to interpret the data on its own and give back the results. From the given results we might be able to infer certain characteristics of other people. For example, if a person's data shows that he follows many car related pages, then we know they might be into them and can target that individual with specific ads. Using the CNN this way, we would be able to efficiently send users ads based on their tastes. Using it this way we would be focusing on the benefits that CNN’s bring to the marketing business. Another direction we can go from here is to look at changes in the data over time and create predictions from the trends they follow.