Thesis Project Portfolio

Graph Matching on the Patterns of Life

(Technical Report)

Heavy Use of Facial Recognition Technology on China's Citizens, Government, and Industry

(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

As data is continuously being released and becoming widely accessible, developers have been able to create very complex technologies for all types of situations. The trade-off between intricate technologies and using more sensitive and specific data is becoming more apparent. Finding the fine line of what data is too intrusive to be used and which regulations should be necessary to continue developing these technologies has become an important issue. The technical thesis covers the process of developing an example of such technology using sensitive data while the STS thesis discusses how social groups have influenced the development of Facial Recognition Technology in China.

The technical thesis explores a prototype pipeline developed from a prior internship that identifies unknown individuals based on their patterns of life. The pipeline's goal is to streamline the process of creating a graph network based on their pattern of life from an individual's call and messaging logs and to then compare it to a database of labeled data, existing logs with a known identity, to find the closest match. The application of this technology is mainly in law enforcement cases where the objective is to identify suspects who use anonymous burner phones. Due to limited labeled data, the project was limited to using calculation intensive algorithms instead of machine learning algorithms such as Graph Neural networks. The prototype was able to produce a promising error rate of 8.25% from the given test data sets, showing potential performance increase with machine learning or alternative algorithms that are more efficient.

The STS thesis explores how three social groups, China's government, people and industry, and their actions affected how China began to define appropriate usage of FRT from the industry and how FRT should be regulated. Industry-produced FRT initially found acceptance in the public by providing both convenience and security. After years of lacking proper regulation, however, FRT from the industry had soon found ways to be implemented redundantly with existing technologies whilst not being ideally securing sensitive data. Both the people of China and the government soon took it upon themselves to make legal changes through a series of events for FRT to abide by new standards and statutes. Through the actions of relevant social groups, the ecosystem where FRT thrived with no resistance rapidly changed to provide optimal conditions to these parties.

The work completed throughout the year overall is very accomplished. The technical portion had successful results as the prototype revealed the concept was possible. The network comparisons can be expanded upon by finding more optimal algorithms to compare such as machine learning and also further down the line increase the amount of networks being compared.

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