



CitiBike InfoVis

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Introduction

This developed app is an mobile device-based visualization platform - CitiBike InfoVis. CitiBike is the bike sharing system operated in New York City. This platform can visualize both historical and real-time bike information. In addition, prediction model was developed for bike info prediction. This platform can be used as a tool for visitors to efficiently use the CitiBike system and can also be used by Citi Bike to determine how to better design the docks as to avoid bike shortages or surpluses at certain docks.

CitiBike consists of over 300 docks, 6,000 bikes, and averages 35,000 rides per day. The system has a live JSON feed with the number of bikes docked at each station at any given moment, as well as historical records of this JSON feed for the past year. This data can be used to visualize how the bikes move throughout the city and create prediction equations for the number of bikes at a dock at a given time. Figure 4 shows the factors and interaction terms that were found to be significant for the final model (Fig. 4):

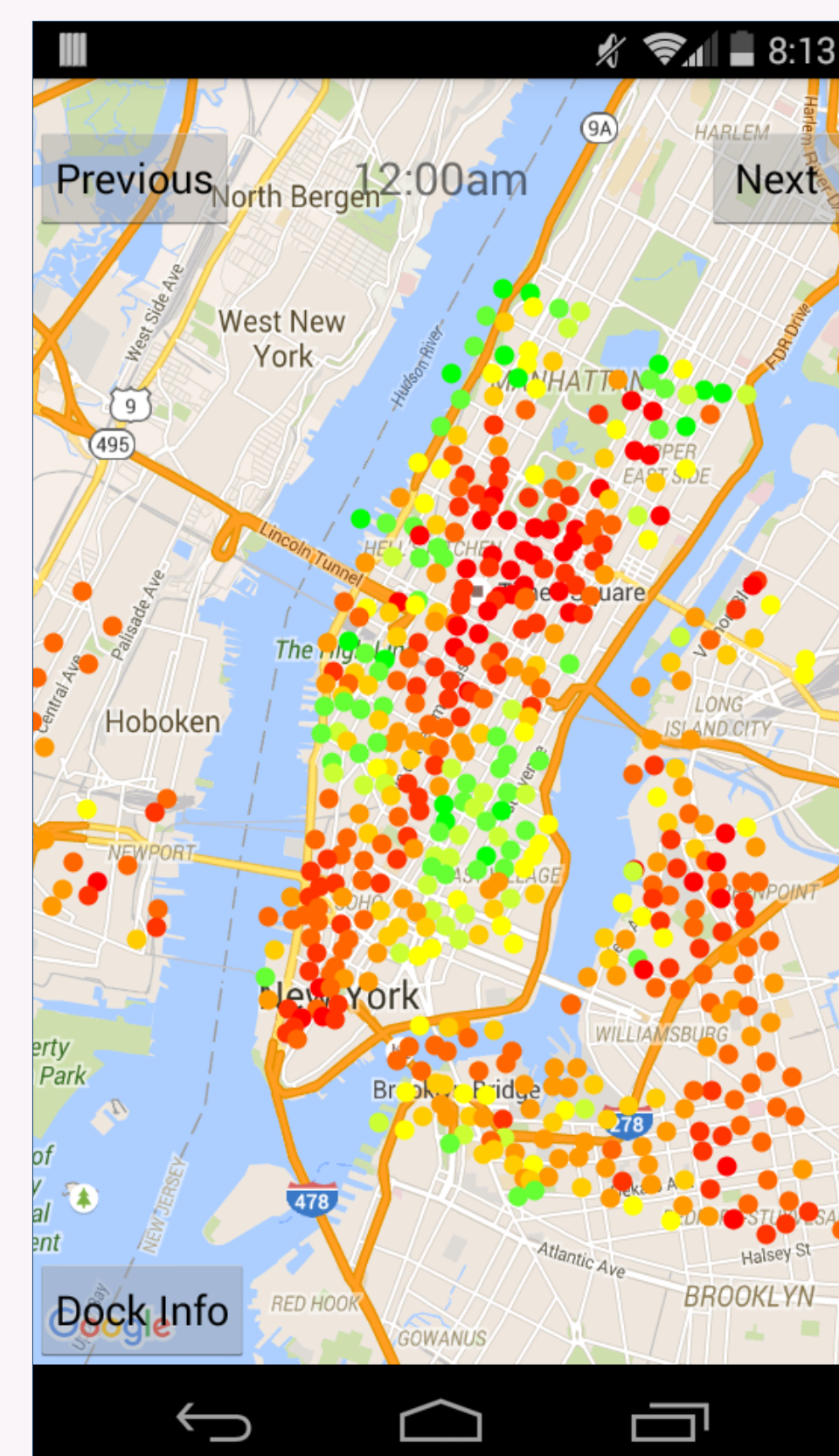


Fig. 1

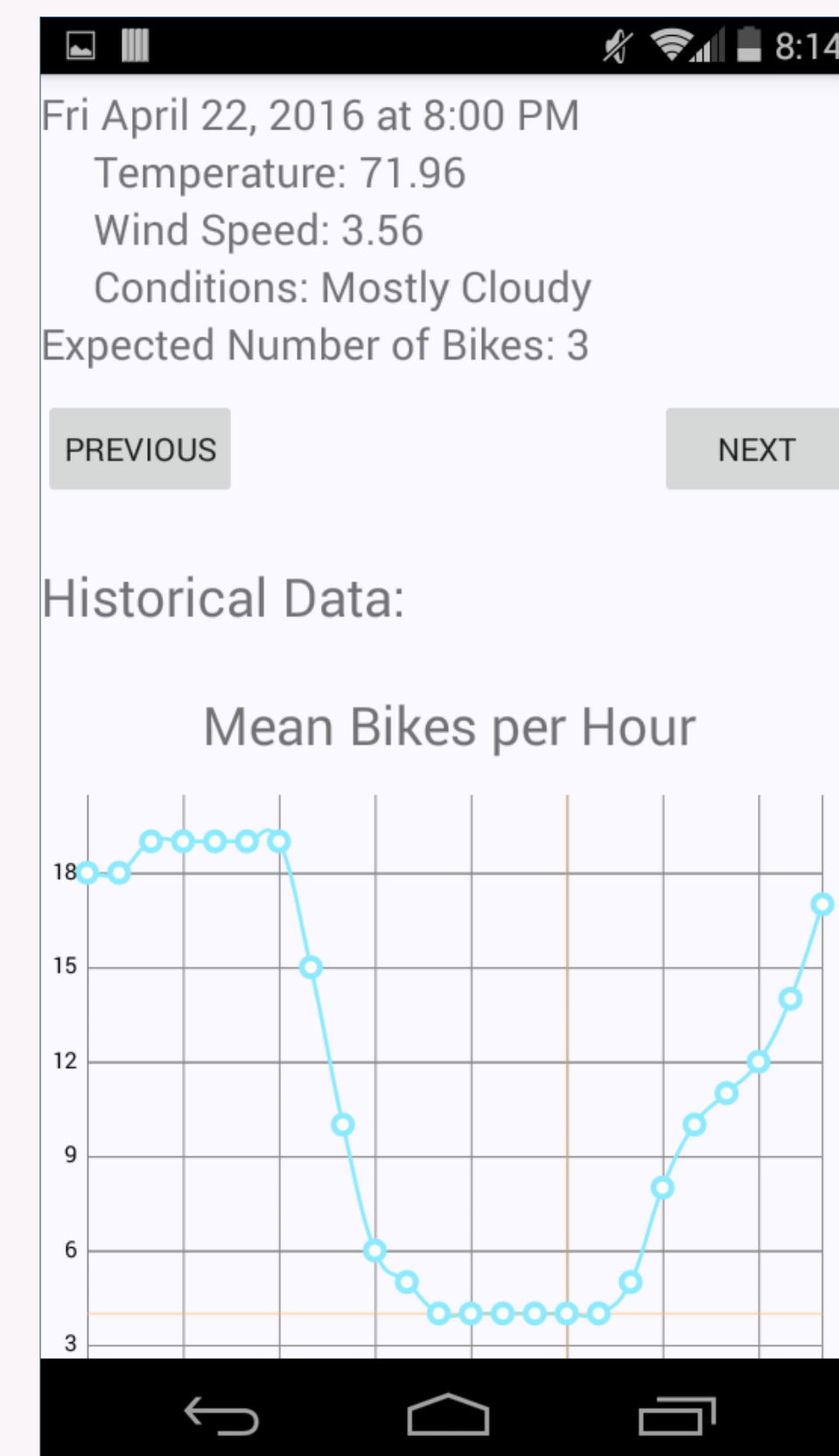


Fig. 2

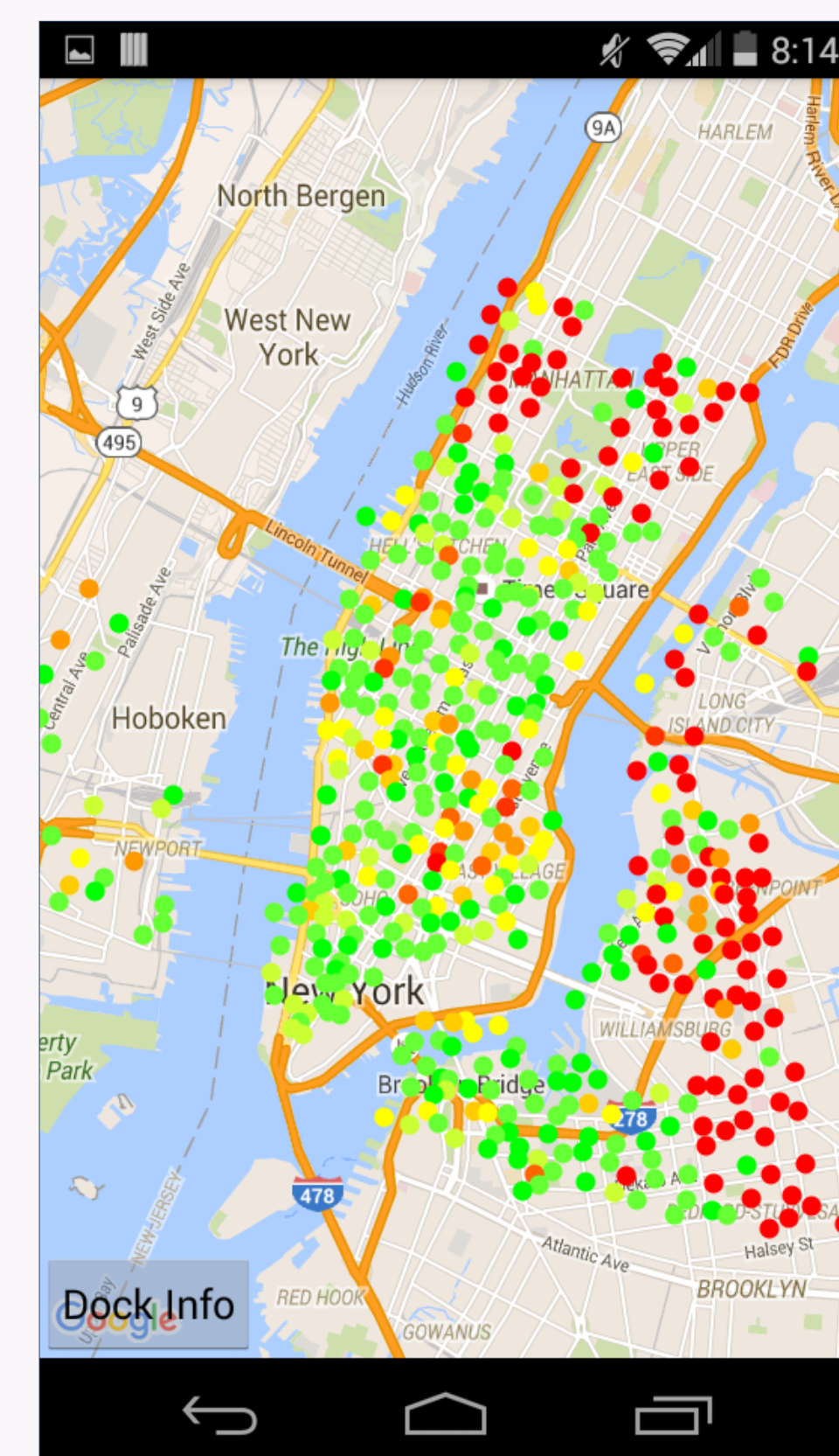


Fig. 3

Factor	P-value
Month	< .001
MonthSqr	< .001
Hour	< .001
HourSqr	0.012
Temp	< .001
Wind	< .001
Event	< .001
Weekend	< .001
hourTemp	< .001
TempWind	< .001

Fig. 4

Discussions and Future Work

The visualization shows how the bikes move throughout the city through the course of and average day (Fig.1), as expected the movement of the bikes from residential areas to commercial areas is visible. In addition, an individual prediction equation was created for each of the docks with hourly predictions for the following two days (Fig. 2). As clearly shown by the error map the prediction equations seem to be very accurate in lower Manhattan but the residual becomes very large as we move into upper Manhattan and Brooklyn (Fig.3). This may be due to either insufficient data for these docks or completely different usage patterns for these docks. Either way further research is required to improve the prediction equations for the docks in these areas.

This project is based on an Independent Study Course: *Mobile Visual Analytics*

Mobile Security

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Introduction

This mobile application is designed to address the security issues (Fig. 1). Mobile security issues are hot research topics nowadays. This research can help the Niagara University Community to be aware of, understand, and self-concerned the security issues and protect privacy. As more people and companies start relying on mobile devices the more data is being stored on cloud storage. This increase of data storage means an increase of data traffic attracting entities to try and compromise this data.

Using the proper security for encrypting and storing data encrypted is vital to users and companies. This app will demonstrate the processes of how to create an algorithm to encrypt your data securely. The method used in this application to implement the algorithms to encrypt data going to the cloud is shown in Fig. 2.



Fig. 1

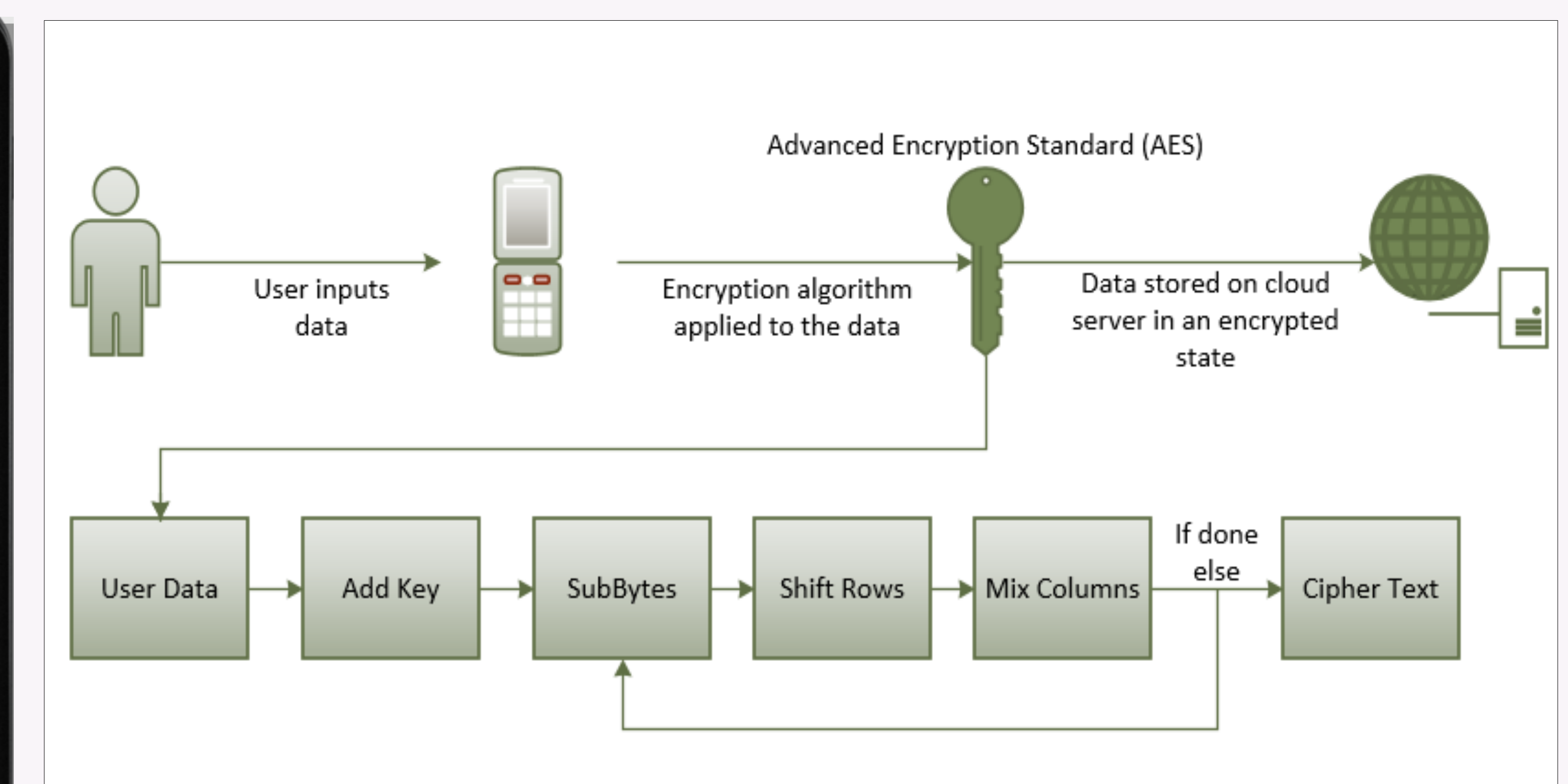


Fig. 2

Discussions and Future Work

To combat the entities trying to compromise data as it is being accessed and stored through mobile devices encryption must keep evolving. The technique called steganography is the hiding of data inside and image, data visualization, and video. This should be used in the future more frequently as by hiding the contents of your data you make it less of a target. With the ability to create bot nets which can equal the cpu power of supercomputers increasing the length of keys is necessary. Taking this research and creating an original algorithm which can be inserted into one image. Then taking that image and putting it inside of data visualization would hopefully create a secure way to send data from one mobile device to another.

This project is based on an Independent Study Course: *Mobile Security*

