|  |
| --- |
| **Student Name: John Smith** |
| **Category: Biomedical and Health Sciences** |
| **Science Teacher’s Name: Jane Smith** |
| **County and Region of Science Fair: Oktibbeha County, Region V** |

**Question or Problem being addressed – Title**

|  |
| --- |
| Assessing the Effect of Traveling on COVID at the County Level Using Machine Learning |

**Hypothesis/Engineering Goals**

|  |
| --- |
| The goal of this project is to create a machine learning algorithm utilizing vaccination data and county-level traveling statistics to accurately predict COVID-19 transmission within Mississippi. |

**Rationale**Brief synopsis of the background research that supports your research problem and explains why this research is important scientifically.

|  |
| --- |
| Because population mobility has been shown to correlate with COVID transmission, it is an ideal indicator for creating accurate predictions. Additionally, little research is conducted at the county level nor is there much research regarding the state of Mississippi. Thus, this research is important to address the lack of literature in this area. |

**Material List**Bulleted list of all items used in research. Make sure to include concentration of all chemicals, source, amount of all living organisms, and all equipment used.

|  |
| --- |
| 1. Computer 2. Python (Packages: Numpy, Pandas, AutoTS) 3. Data: Bureau of Transportation Statistics, Center for Disease Control Vaccination Statistics |

**Procedure**Describe in detail the method or procedure required to complete your project, including risk and safety, proper disposal of materials if needed.

|  |
| --- |
| 1. Data will be compiled from the sources described in the bibliography to obtain an accurate representation of both traveling and vaccination data of Mississippi. 2. To create a prediction on new COVID data, a model forecasting traveling and vaccination data will be developed. The Python package AutoTS will utilize a genetic algorithm to determine the most accurate time series model for these predictions. 3. To examine the accuracy of the model, predictions based on preliminary COVID data will be compared with current data on the spread of COVID. |

**Data Analysis**Describe the procedure you will use to analyze the data that will answer the research question, hypothesis, or engineering goal?

|  |
| --- |
| 1. Throughout the project, data will mainly be analyzed using the python packages numpy and pandas. Various statistics will also be calculated to confirm results. |

**Bibliography**

|  |
| --- |
| IISInfo. (n.d.). *Covid-19 vaccinations in the United States,county*. Centers for Disease Control and Prevention. Retrieved January 27, 2022, from https://data.cdc.gov/Vaccinations/COVID-19-Vaccinations-in-the-United-States-County/8xkx-amqh  Maryland Transportation Institute and Center for Advanced Transportation Technology Laboratory at the University of Maryland. (2022, January 24). *Trips by distance: Open data: Socrata*. Bureau of Transportation Statistics. Retrieved January 27, 2022, from https://data.bts.gov/Research-and-Statistics/Trips-by-Distance/w96p-f2qv  The New York Times. (2020, March 3). *Coronavirus in the U.S.: Latest Map and case count*. The New York Times. Retrieved January 27, 2022, from https://www.nytimes.com/interactive/2021/us/covid-cases.html  Ribeiro, S. P., Dáttilo, W., Barbosa, D. S., Coura-Vital, W., Chagas, I. A. D., Dias, C. P., Silva, A. V. D. C. E., Morais, M. H. F., Góes-Neto, A., Azevedo, V. A., Fernandes, G. W., & Reis, A. B. (2020, September 16). *Worldwide covid-19 spreading explained: Traveling numbers as a primary driver for the pandemic*. Anais da Academia Brasileira de Ciências. Retrieved January 27, 2022, from https://www.scielo.br/j/aabc/a/76CfqdL5pPBZLcQy9FdWwxn/?lang=en&%3Bformat=html  Zeng1, C., Zhang1, J., Li1, Z., Sun1, X., Olatosi1, B., Weissman1, S., Li1, X., & Zeng, C. A. C. (2021, April 13). *Spatial-temporal relationship between population mobility and covid-19 outbreaks in South Carolina: Time Series Forecasting Analysis*. Journal of Medical Internet Research. Retrieved January 27, 2022, from https://www.jmir.org/2021/4/e27045/ |