Covid 19 Prediction

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CMSE 801

Some Facts

- COVID-19 (coronavirus disease 2019) is a disease caused by a virus named SARS-CoV-2 and was discovered in December 2019.
- It is very contagious and has quickly spread around the world.
- Common symptoms of COVID-19 include a fever, cough, congestion, and shortness of breath, chills, muscle aches, and loss of taste or smell.
- People who have chronic health issues or compromised immune systems, such as heart disease, lung disease, or diabetes, are at a greater risk of becoming seriously ill.

METHODS

- Prediction of disease spread using “polyfit” function.
- Demonstrating the spread of covid in lower to higher density regions using Agent Based Modelling.

Project Motivation

- To predict how Covid19 will spread without the use of vaccine.
- To show it spreads faster in higher population density regions.

Reading csv File

```
In [2]: data = pd.read_csv("michigan-history.csv", encoding="ISO-8859-1",)
        data.head()
```

Out[2]:

	date	state	death	deathConfirmed	deathIncrease	deathProbable	hospitalized	hospitalizedCumulative	hospitalizedCurrently	hospitalizedIncrease	...	tota
0	2021-03-07	MI	16658.0	15666	0	992	NaN	NaN	866.0	0	...	
1	2021-03-06	MI	16658.0	15666	57	992	NaN	NaN	866.0	0	...	
2	2021-03-05	MI	16601.0	15610	12	991	NaN	NaN	866.0	0	...	
3	2021-03-04	MI	16589.0	15600	39	989	NaN	NaN	890.0	0	...	
4	2021-03-03	MI	16550.0	15563	6	987	NaN	NaN	882.0	0	...	

5 rows × 41 columns

Dataset Overview

- The dataset is provided by this website: https://covidtracking.com/data/state/Michigan.
- There are 41 features in this dataset.

```
In [3]: data.columns

Out[3]: Index(['date', 'state', 'death', 'deathConfirmed', 'deathIncrease',
               'deathProbable', 'hospitalized', 'hospitalizedCumulative',
               'hospitalizedCurrently', 'hospitalizedIncrease', 'inIcuCumulative',
               'inIcuCurrently', 'negative', 'negativeIncrease',
               'negativeTestsAntibody', 'negativeTestsPeopleAntibody',
               'negativeTestsViral', 'onVentilatorCumulative', 'onVentilatorCurrently',
               'positive', 'positiveCasesViral', 'positiveIncrease', 'positiveScore',
               'positiveTestsAntibody', 'positiveTestsAntigen',
               'positiveTestsPeopleAntibody', 'positiveTestsPeopleAntigen',
               'positiveTestsViral', 'recovered', 'totalTestEncountersViral',
               'totalTestEncountersViralIncrease', 'totalTestResults',
               'totalTestResultsIncrease', 'totalTestsAntibody', 'totalTestsAntigen',
               'totalTestsPeopleAntibody', 'totalTestsPeopleAntigen',
               'totalTestsPeopleViral', 'totalTestsPeopleViralIncrease',
               'totalTestsViral', 'totalTestsViralIncrease'],
              dtype='object')

In [108]: print("Total number of features in the dataset are:",len(data.columns))

          Total number of features in the dataset are: 41
```

Future Prediction of Covid

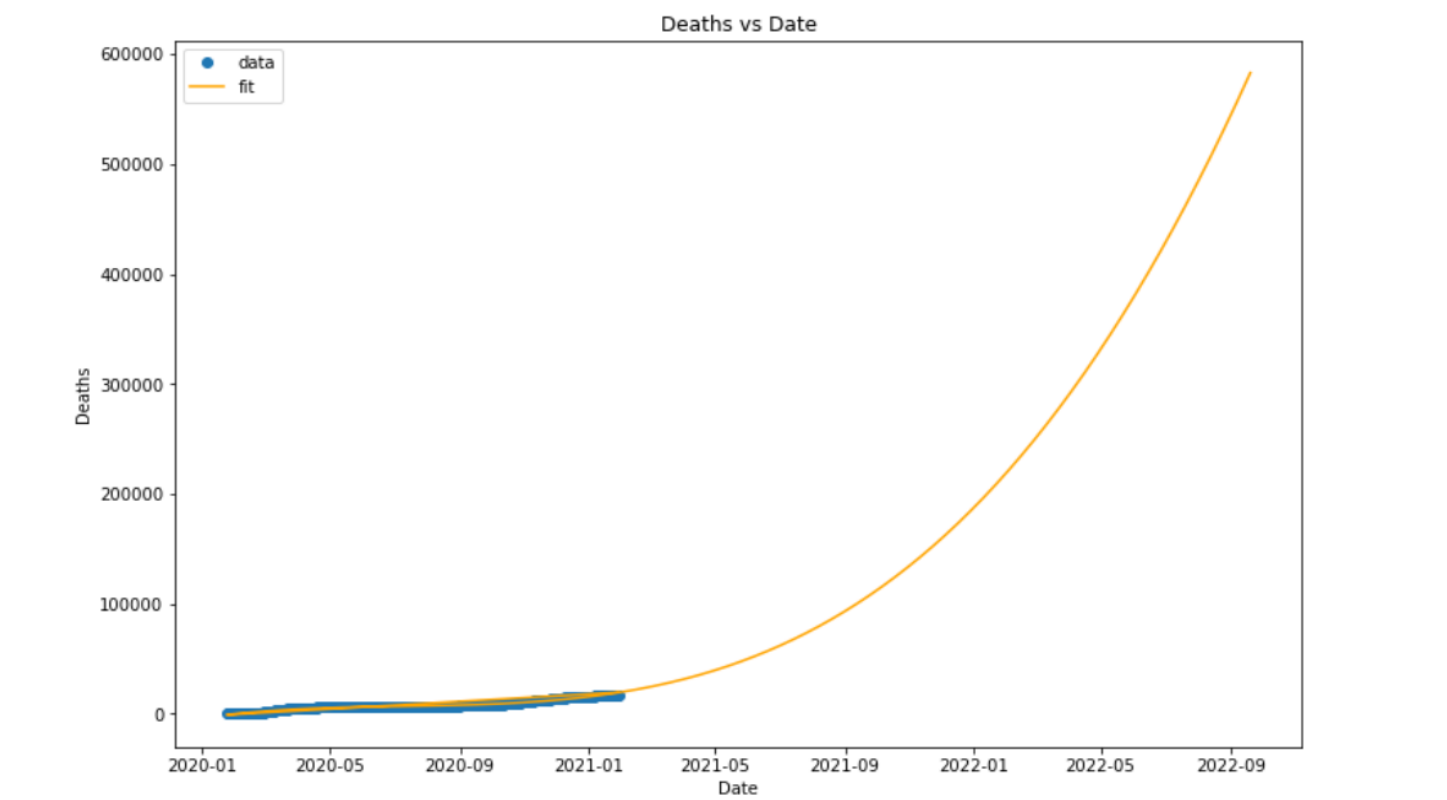
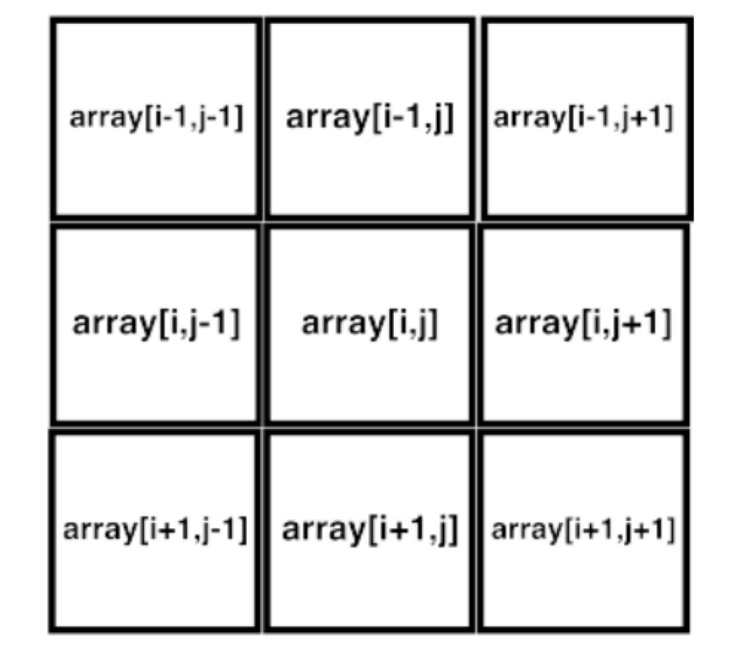


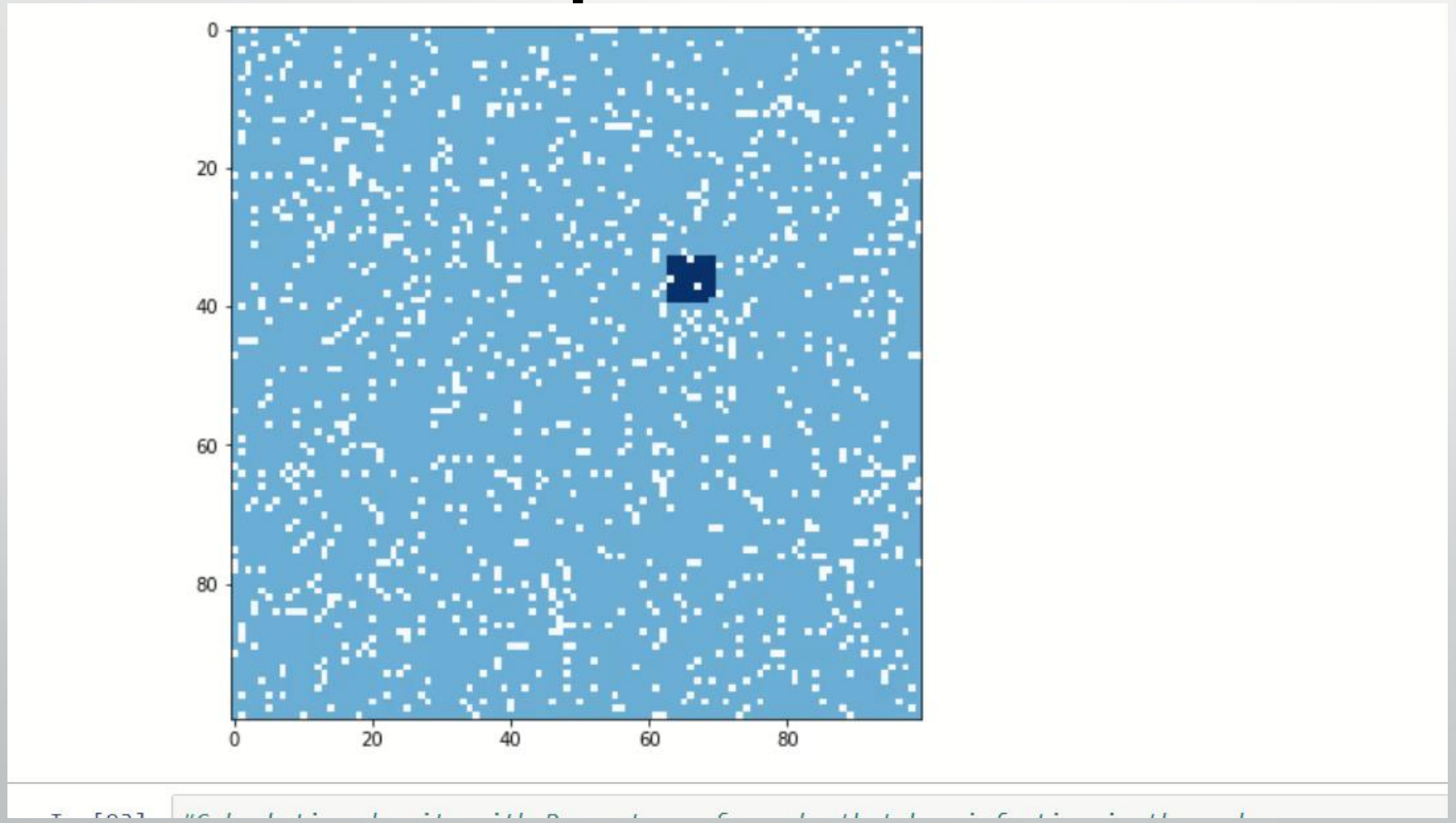
Figure 1. This figure shows us the Death vs Date data with the given data till the beginning of 2021 and then predicted data till the end of 2022.

Moore Neighbourhood

- We have used Moore Neighbourhood in our project because it is a true depiction of the spread of a disease.



Animation of spread of Covid Infection



Results

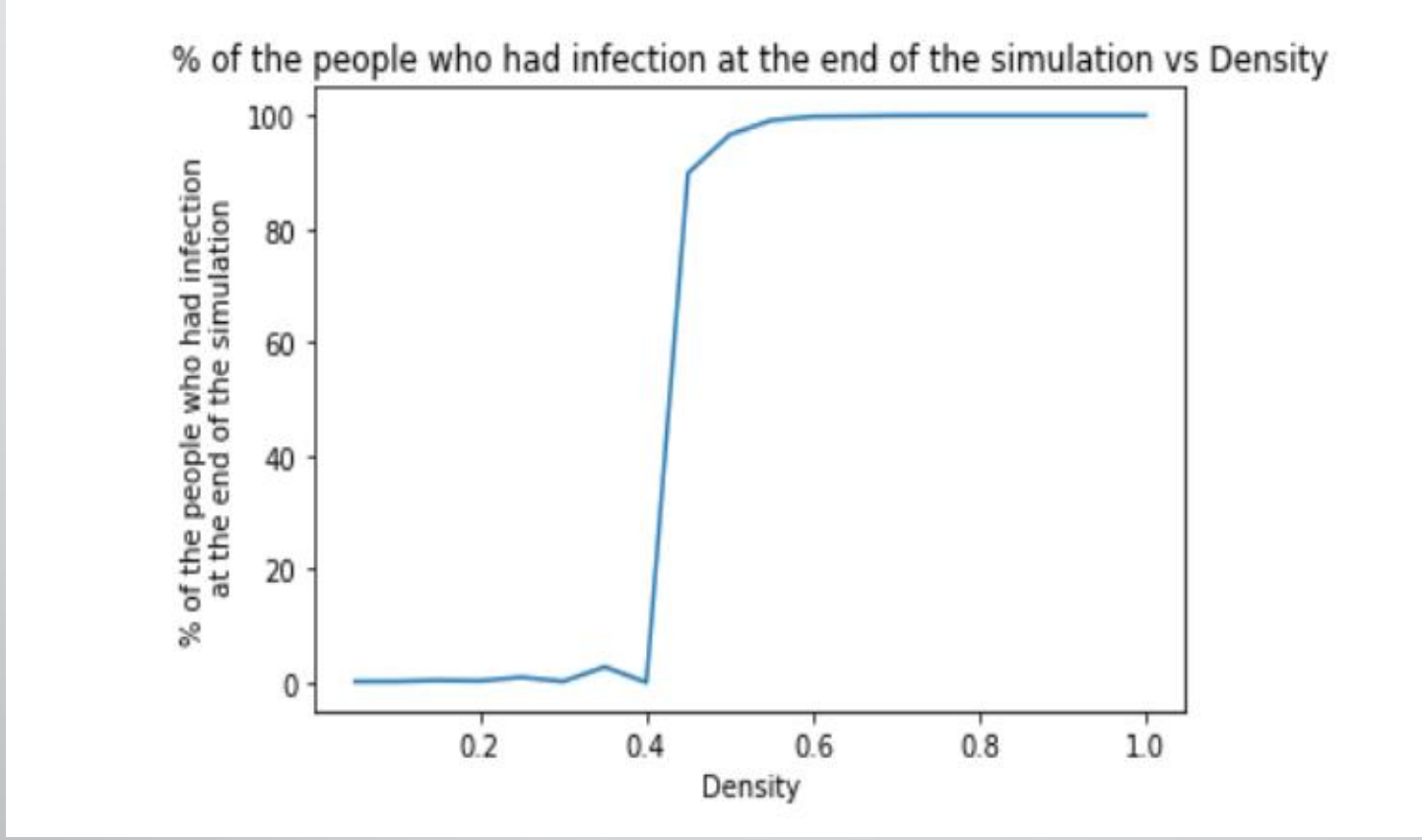


Figure 2. This figure shows us the Percentage of the people who had infection at the end of the simulation vs Density.

List of Libraries used

- import pandas as pd
- import matplotlib.pyplot as plt
- import numpy as np
- import datetime
- from datetime import timedelta
- import time
- import random as random
- from IPython.display import display, clear_output

Conclusion

- Our project predicts the spread of Covid in the future but it does not take under consideration, the effects of vaccination.
- Our prediction follows third-order polynomial.
- It also shows how the effect of a disease spread with increase in the density.

Thank You!!