

**PFE 12**

Palubicki

# Project 20 points

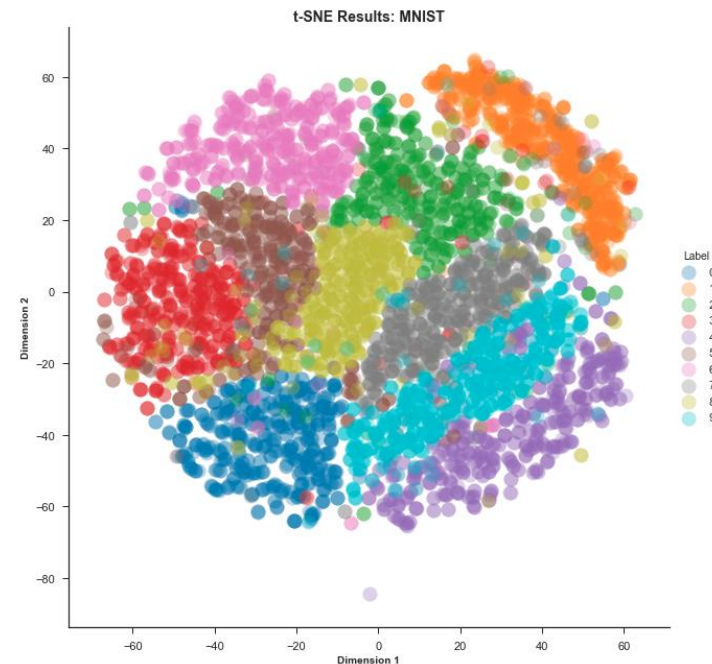
- 2 people teams
- Due 23 June, 13.45, submit slides and source code before
- 15 minute slide presentation: 5-15 pts
- Implementation: 5-15 pts

# t-distributed stochastic neighbor embedding (15-5)

- Describe t-SNE method
- Reimplement

<https://www.datacamp.com/community/tutorials/introduction-t-sne>

- Use data from google drive

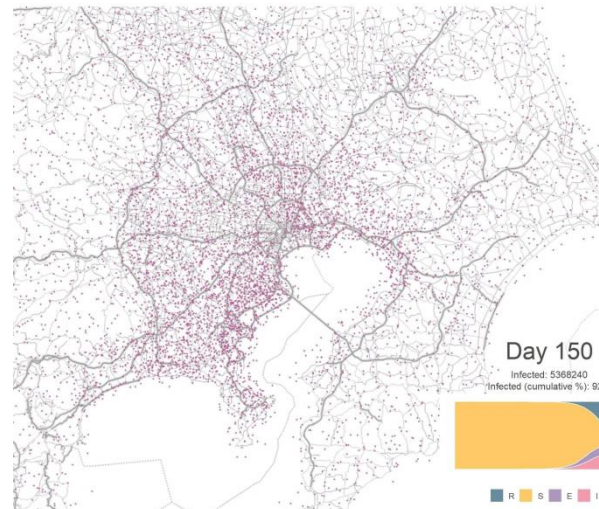


# Compartmental Epidemic Model in Cities (15-5)

- Describe SEIR Model
- Introduce Origin-Destination Matrices
- Reimplement

[https://www.databentobox.com/2020/03/28/covid19\\_city\\_simulation\\_seir/](https://www.databentobox.com/2020/03/28/covid19_city_simulation_seir/)

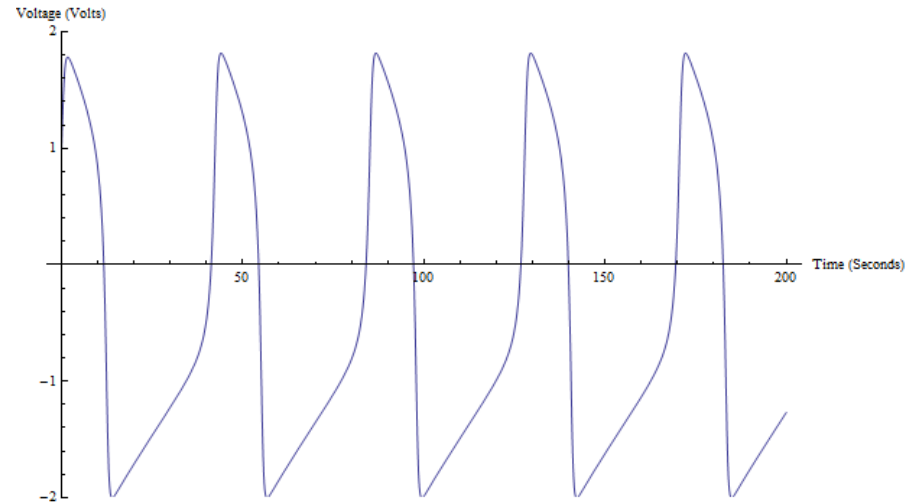
- Use Poznan OD matrix



# Neuron Excitation Model (15-5)

- Describe FitzHugh Nagumo model
- Explain what are phase diagrams and bifurcation analyses
- Simulate model and give examples

[https://www.normalesup.org/~doulcier/teaching/modeling/excitable\\_systems.html](https://www.normalesup.org/~doulcier/teaching/modeling/excitable_systems.html)



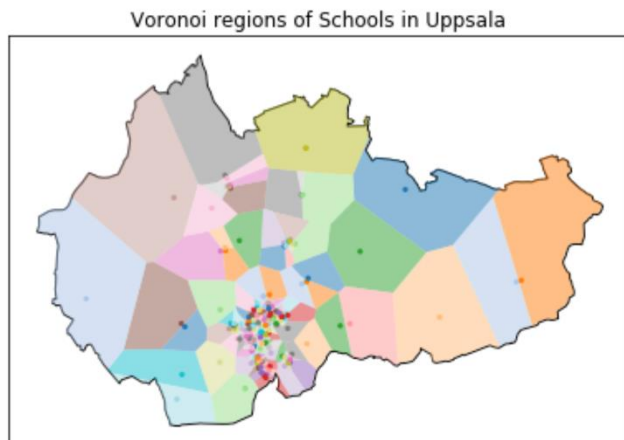
# Apple Tree Growth (5-15)

- Describe [stocatree](#) module
- Create a dataset of 5000 different apple tree model images with corresponding parameter values in separate csv file
- Show a quantitative analysis of the apple tree shape based on the image set you created

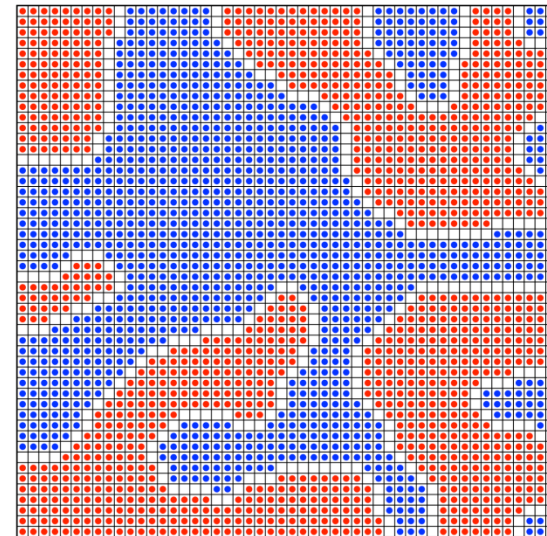


# Schelling Segregation Model (5-15)

- Describe Schelling Model
- Reimplement <https://ytliu0.github.io/schelling/>
- Use a Voronoi subdivision of Poznan for simulation (use geopandas)



Voronoi Diagram



# Bird flocking (10-10)

- Describe Boids algorithm
- Implement [Boids](#) in vpython
- Introduce predators that prey on the boids flock
- Describe your method and plot graphs of population size fluctuations over time





# Wheat/Maize Growth Model (10-10)

- Describe [ADEL-Wheat](#) model
- Create an animated video of crop plantation growth

