Geospatial Data Science

Course Summary

Course Components

- Data and Compute
  - Types of data
    - Raster, Vector and Surfaces
    - CRS, Inter-data conversion through sampling and aggregation
  - Which algorithms to run?
    - Indices – social, physical, etc.
    - Spatial weights – rook, queen, knn..
    - Spatial statistics – Moran's I, LISA, Point process models, Ripleys' G, F, etc.
    - Spatial ML – clustering, regionalization, regression, etc.
    - Spatio-temporal statistics
    - Systemic models
      - Agent based models
      - Process models
      - Hybrid models
  - How to implement/scale
    - EE, Python
    - Which libraries to use?
    - PostGIS

- Satellites and sensors
  - Where are the satellites?
    - Geostationary, MEO, LEO
    - How frequently can they sense and with what bandwidth can they communicate?
  - What sensors do they carry?
    - Multispectral, Hyperspectral, Radar
  - What properties of the earth can the sensors sense?
    - Crops, Forests, Water, Buildings, Heat
    - But now more than ever, objects, structures, time series patterns

- Domains that care
  - Community building and decision making (**Aadi**)
  - Climate (**Li**)
  - Environment
  - Urban Planning (**Li**)
  - Agriculture (**Praveen**)
  - Waste Management
  - House Pricing
  - Uberization (transport of humans, food, equipment, etc.)
  - Building efficiency (**Vishal**)
  - New age tools - GIS (**Michael**)

  - **Of course many more..**

Your eval components

- Exams (50)
  - Can you think geospatially? Find the right formats, algorithms and implementation choices

- Case studies (10)
  - Identify some interesting areas of application of satellite imagery?

- Project (30)
  - Build something interesting by understanding nuances of a domain
  - where data and images become the backdrop and **the story takes center stage**

- Attendance (10)
  - Thanks for coming!