Digital Divide Index (DDI)
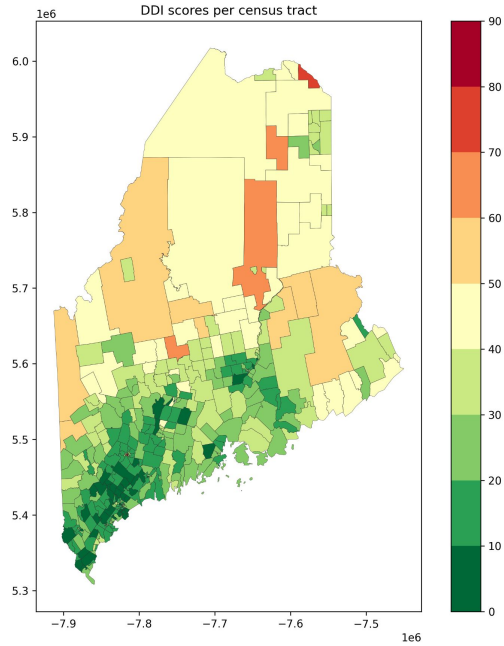
Tao Yuan,Qian Yin,Sihan Bai
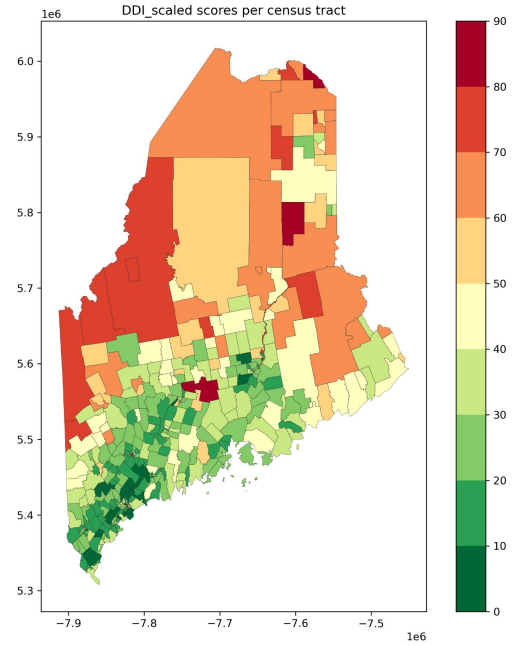
DDI

- INFA (Infrastructure Access) = NIA * 0.3 + NCD * 0.3 - DNS * 0.05 - UPS * 0.05
- SE = AGE65 + POV + LTHS + DIS
- DDI (Digital Divide Index) = INFA + SE

- Digital Equity Act of 2021
- SE (Socio-Economic) = AGE60 + INCAR + VET + DIS + MIN + RURAL + LANG + POV

2023 spring

2024 spring

DDI scores per census tract

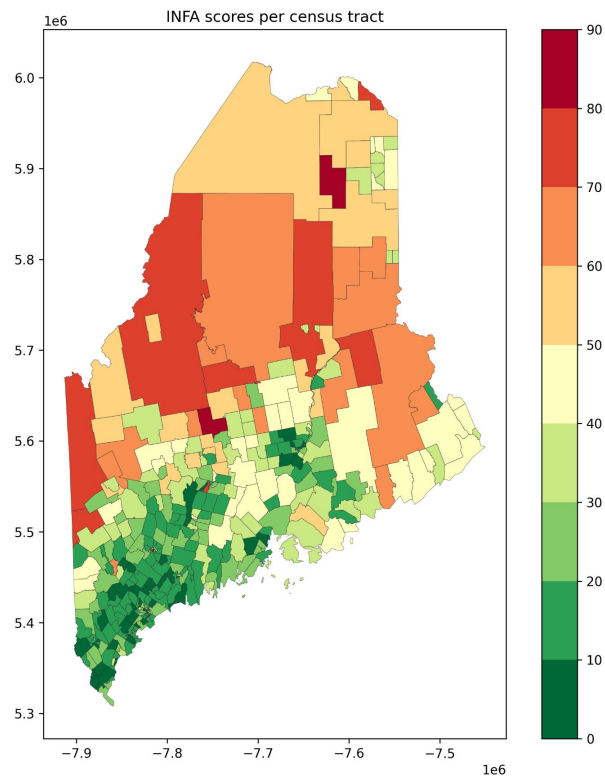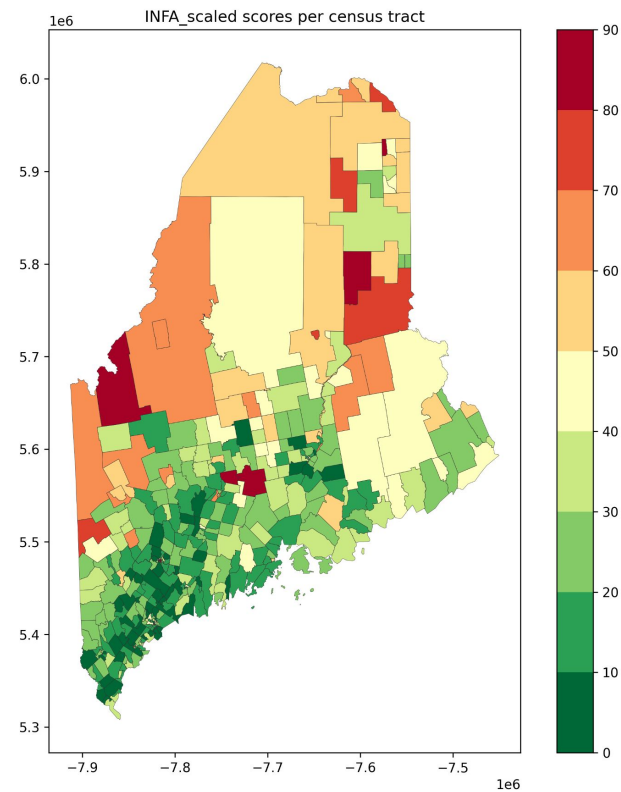DDI_scaled scores per census tract

- The increasing DDI may be caused by the difference in DDI formula.

INFA

INFA (Infrastructure Access) = NIA * 0.3 + NCD * 0.3 - DNS * 0.05 - UPS * 0.05

* NIA: z-scores of the percent of population with no internet access(NIA)

* NCD: z-scores of the percent of population with no computing devices (NCD)

* DNS: z-scores of the average max download available (DNS)

* UPS: z-scores of the average max upload available (UPS)

2023 spring

INFA scores per census tract
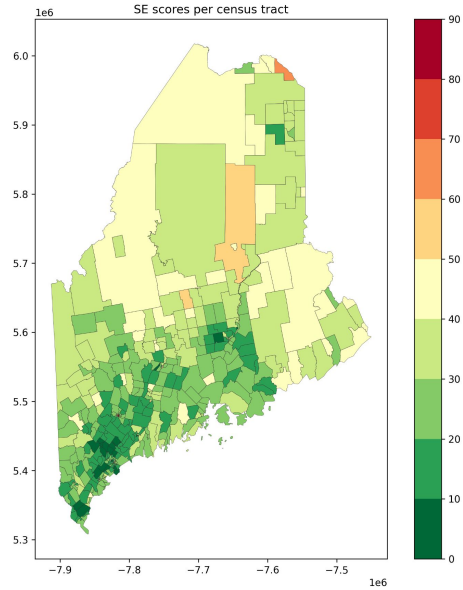
2024 spring

INFA_scaled scores per census tract

SE
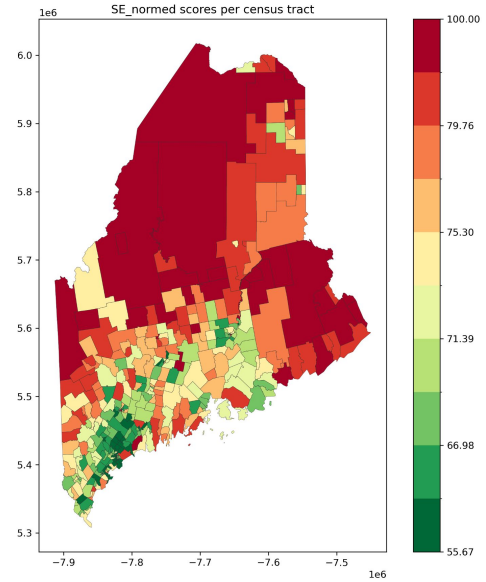
SE: Socioecnomic = AGE60 + INCAR + VET + DIS + MIN + RURAL + LANG + POV

* AGE60: z-scores of the percent of population with age over 60

* INCAR: z-scores of the percent of incarcerated individuals

* VET: z-scores of the percent of veterans

* DIS: z-scores of the percent of population with disabilities

2023 spring

2024 spring

SE scores per census tract

SE_normed scores per census tract

● The SE component includes more socioeconomic factors, leading to the notable difference.
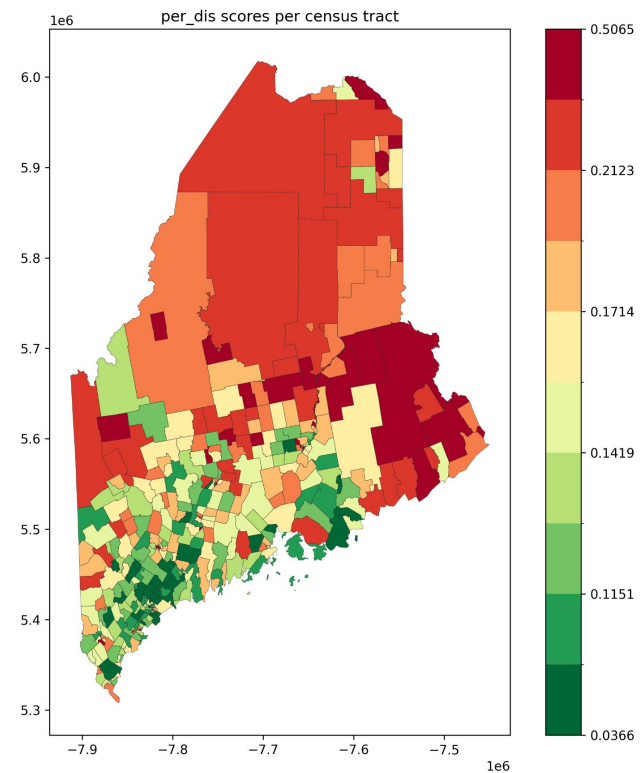
VET & DIS

Left:

Veterans

Right:

Disabilities
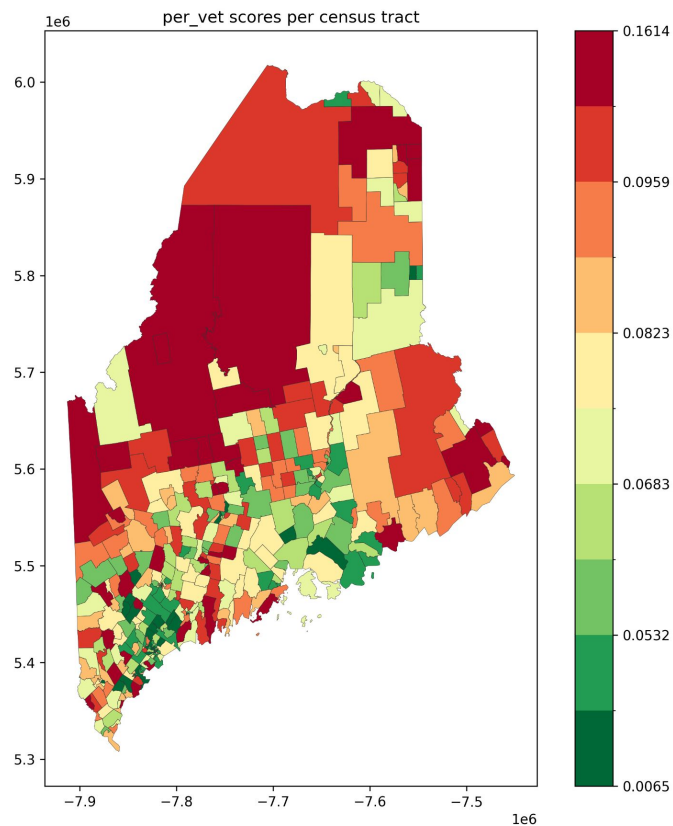
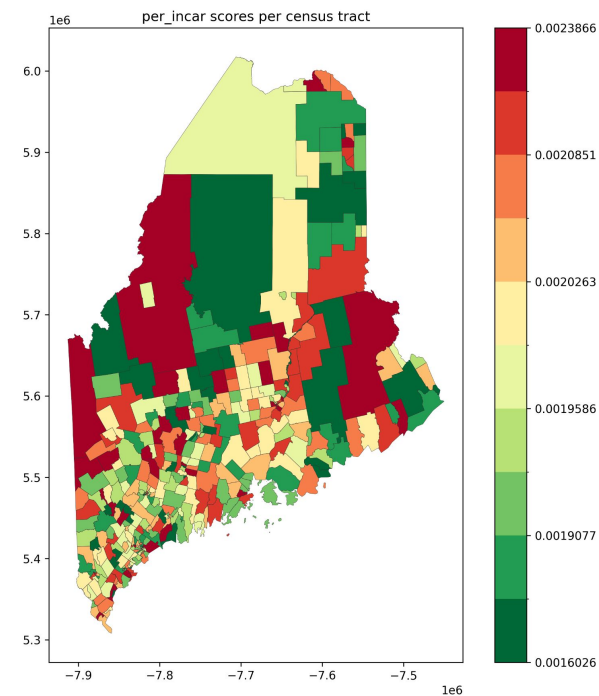# AGE 60 & INCAR

Left:

Population over 60

Right:

Incarcerated individuals

per_over60 scores per census tract

per_incar scores per census tract
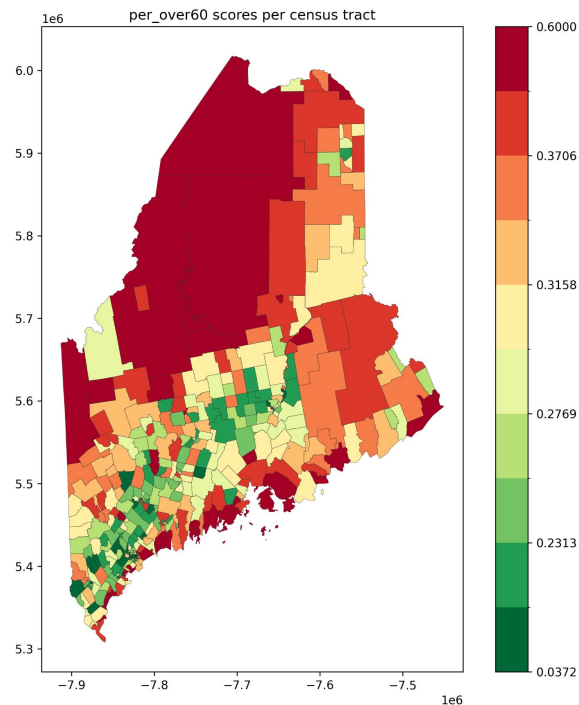
Rural & Lang

- Both populations are calculated through estimation. (inaccuracy)
- Rural/urban label is assigned to each block (geograph) -> Some census tracts include only rural residents

People with language barriers
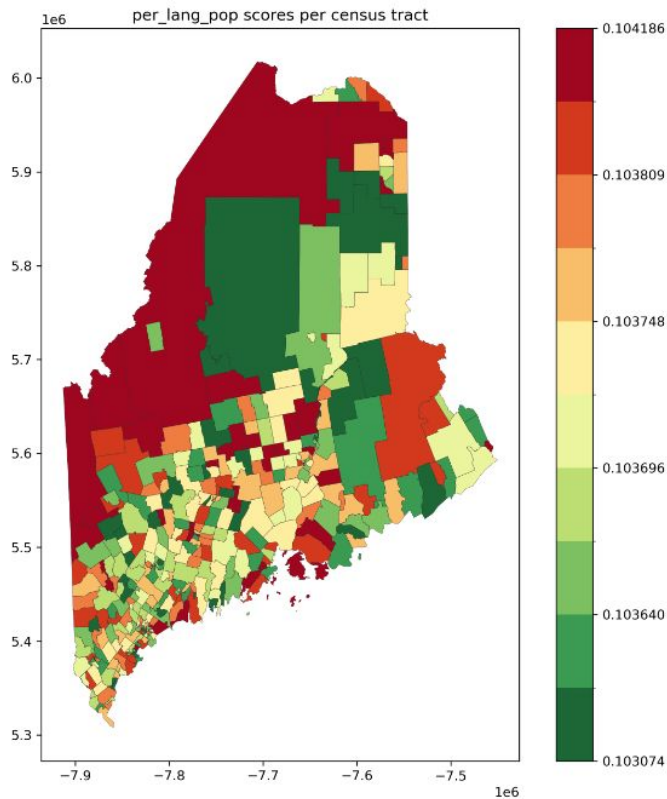
Rural residents
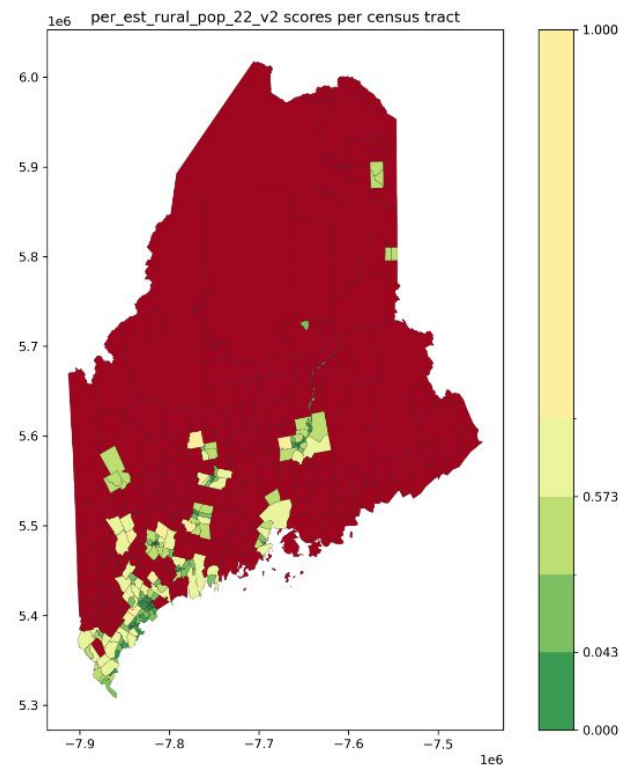
Poverty & Minority

- Minority population are concentrated in urban centers.
- The distribution of poverty population might reflect the economic development.

Minority population

per_minority_pop scores per census tract

Poverty population

per_poverty_pop scores per census tract

Analysis (Top N census tracts list for SE factors)

- Method: examination of the top-ranking areas across various SE factors
  - Identify census tracts consistently shown in multiple lists (threshold: overlaps exceed half the length of each list)
- Goal: identify the specific issues in areas and guide the type of supports.
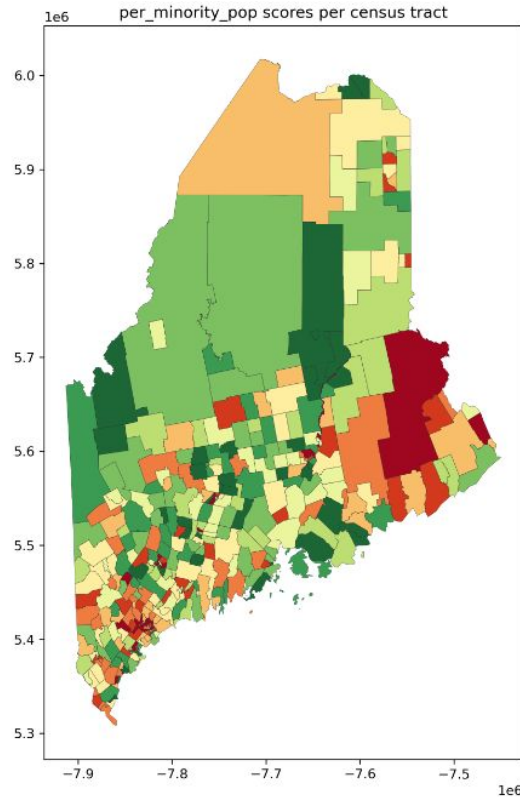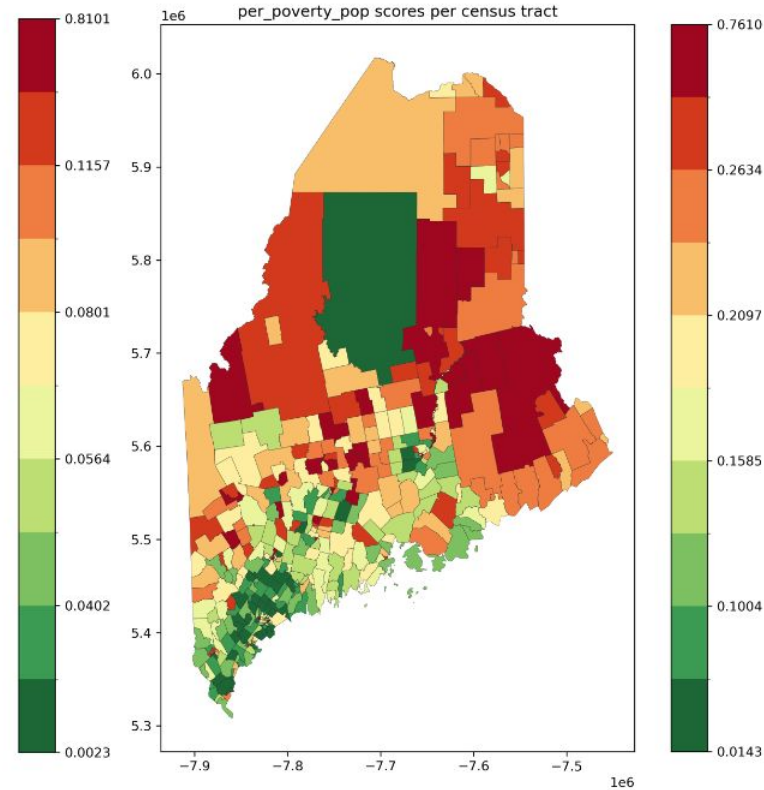- Incarcerated and Language - shown in top 5/10/50
  - Similar method used in estimating these population
- Disabled and Poverty - shown in top 10/50
  - Disabled population and people with low-income are both concentrated in these locations.
  - Possible correlation between these two factors

```
Top 5 Comparison
-------------------------------------------
3 common locations between Incarcerated and Language

Top 10 Comparison
-------------------------------------------
10 common locations between Incarcerated and Language
-------------------------------------------
5 common locations between Disabled and Poverty

Top 50 Comparison
-------------------------------------------
28 common locations between Over 60 and Incarcerated
-------------------------------------------
28 common locations between Over 60 and Veterans
-------------------------------------------
26 common locations between Over 60 and Rural
-------------------------------------------
30 common locations between Over 60 and Language
-------------------------------------------
30 common locations between Incarcerated and Rural
-------------------------------------------
42 common locations between Incarcerated and Language
-------------------------------------------
26 common locations between Disabled and Poverty
-------------------------------------------
27 common locations between Rural and Language
```

Next Step

1. Solve the challenges faced when calculating the scores
   a. Inaccurate data (language barrier, incarcerated, rural) should be modified by collecting more reliable data and using more advanced estimation techniques.
   b. Validation step should be added to evaluate the data and results.
   c. Missing census tracts should be analyzed to understand the reason.
2. Conduct more comprehensive analysis
   a. Comparisons between factors in each census tract can identify the most important issues in the specific census tract -> inform more targeted resource allocation
   b. The possible correlation between factors can be investigated.
3. Improve the front-facing interface
   a. Static maps can only show the overall distribution; therefore, using an interactive table and map to explore data can be more effective.