

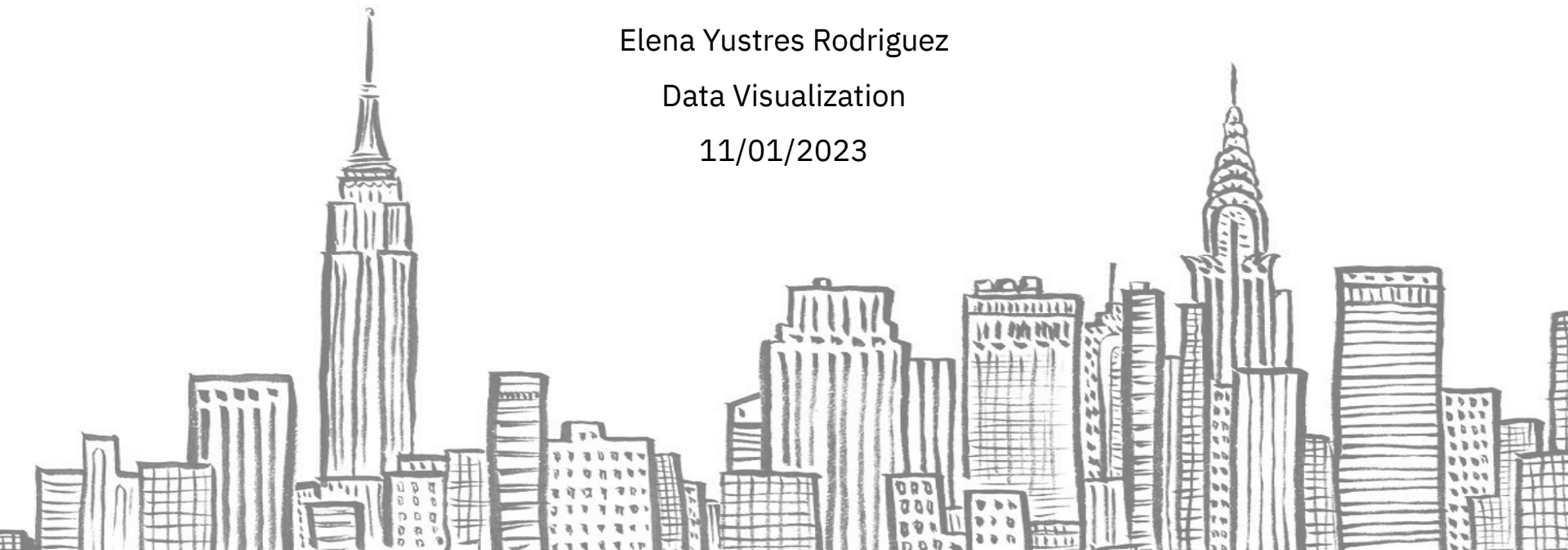
Visualizing the Growth Potential of Chinese Cities:

Construction of Maps using *ggplot()* in R

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Data Visualization

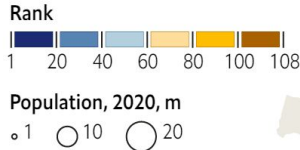
11/01/2023



I. The Original Chart

March of the cities

China, emerging city ranking, 2022
1=best



- Highest ranked
- 1 Hangzhou
 - 2 Shenzhen
 - 3 Shanghai
 - 4 Suzhou
 - 5 Guangzhou

Source: EIU

The Economist

ECONOMIST
INTELLIGENCE

EIU

Chart in 'The Economist': "China's GDP is flagging. Where might growth come from?"

- Growth → urbanization → more growth in cities, but which ones?
- Ranking of 106 cities according to comprehensive growth potential scores in "China Emerging City Rankings (2022)" (Economist Intelligence Unit)

<i>Data item:</i> city	<i>Visual mark:</i> point
<i>Data attributes:</i> rank , population and location	<i>Visual channels:</i> hue , size and x-y position

STRENGTHS

- Informative title, subtitle and annotations
- Clear encoding of **ranking**, **population** ("area is tricky") and **location**

WEAKNESSES

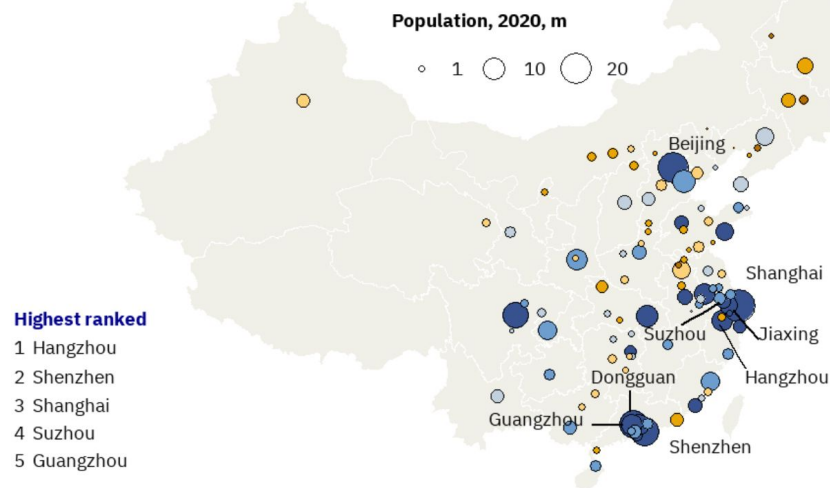
- Tufte's data-ink ratio
- Fill legend: choice of color palette and too many bins
- Redundancy of information in annotations of cities

II. Replication: The Highlights

March of the cities

China, emerging city ranking, 2022

1=best



Source: EIU

- Collection and processing of the data
 - ◆ Four different data sources
 - ◆ Missing data
 - ◆ Different cities with the same name in different provinces

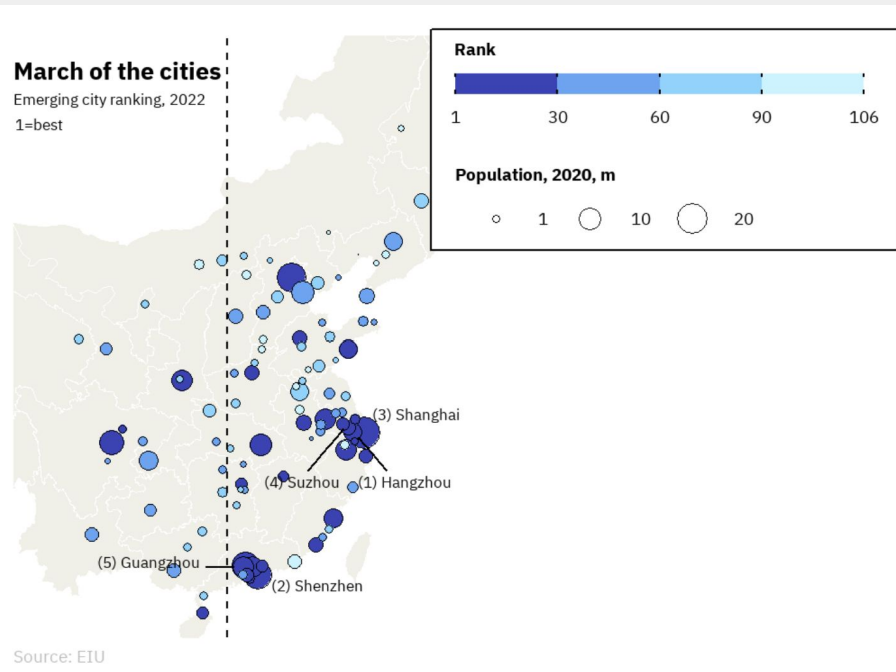
- Map **aes()** into ``geom_polygon()`` and ``geom_path()`` separately

- Scales
 - ◆ Working with two different legends:
 - For size, `scale_size` ≠ `scale_size_binned()`
 - For color, `guide_colorsteps` ≠ `guide_colorbar`

- Annotations

```
p4 <- p3 +  
  annotate("text", x=67, y=51, label="1=best",  
    size=6, family="IBM Plex Sans") +  
  annotate("text", x=65, y=30, label="Highest ranked",  
    size=5, family="IBM Plex Sans", hjust=0, vjust=0, angle=0,  
    fontface="bold", color="blue4") +  
  ...  
  annotate("text", x=122, y=26, label="Hangzhou",  
    size=5, hjust=0, vjust=0, family="IBM Plex Sans") +  
  annotate("text", x=116, y=21, label="Shenzhen",  
    size=5, hjust=0, vjust=0, family="IBM Plex Sans") +  
  ...  
  annotate("segment", x = 113, y = 25.5,  
    xend = 113, yend = 24) +
```

III. Potential Enhancements



- (1) Maximize data-ink ratio: define coordinates and “zoom in”

```
p + coord_map(xlim=c(100, 155), ylim=c(20, 50))
```

- (2) Dashed line to show that only one city among “top 10” is west of 112°

```
geom_vline(xintercept=112, linetype="dashed")
```

- (3) Fill scale:

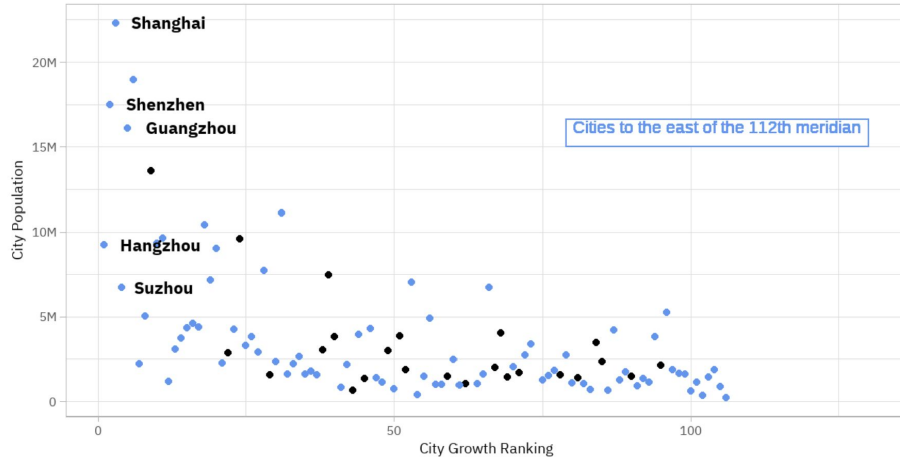
- (a) Change of color palette: darker shade = higher growth potential
- (b) For discriminability, 6 → 4 bins

- (4) Simplification of annotations: label **and** ranking on the map

IV. Alternative visualization

Urbanization and economic growth in China

Emerging city ranking, 2022



Coastal cities have highest growth potential

- Key idea of the chart: convey the relationship (*if there is one*) between growth potential, population and location
- Hence:
 - **Population** vs. **ranking**: negative relationship, but higher spread for highest-ranked cities
 - **Location**: unclear relationship with ranking, but clear majority of cities in the dataset are on the Coast
- Conclusion: the coast is the engine of China's development

Q & A

Thank you for your attention!