

ECOLOGICAL INFERENCE

CSE416-S01 - Software Engineering

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CSE416 - Software Engineering

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Reference

- Florida 2000 Analysis
www.usccr.gov/files/pubs/vote2000/report/appendix/lichtman/ltrpt.htm
- PyEI background
www.theoj.org/joss-papers/joss.03397/10.21105.joss.03397.pdf
- PyEI
<https://github.com/mggg/ecological-inference>

References not a perfect match for the project use cases

1. No precinct data
2. Florida 200 paper does not show probabilities
3. PyEI refers to voting results, not voting processes

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Session Objectives

- Understand the purpose of Ecological Inference (EI)
- Get started in using PyEI software for EI analysis
- Understand how to extend your GUI design to include charts for EI

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Ecological Inference and the Voting Rights Act (VRA)

- Pre-1965 – Significant discrimination against African Americans in formerly slave-holding states
- 1965 – Voting Rights Act enacted
 - Outlawed poll taxes and literacy tests
 - Preclearance required for changes in voting for states/jurisdictions with a history of voting discrimination
- 1975 – Protections extended to language minority groups
- 2013 – Supreme Court struck down preclearance requirement
- 2025-2026 – Supreme Court case challenging remaining aspects of VRA

EI is used to measure adherence to VRA

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State Selection

- Each team needs a state with an asterisk
- You can pick one or change your Republican state

Republican-dominated State		
Alabama *		
Arkansas	Raptors	
Florida	Lakers	Timberwolves
Iowa	Pelicans	Magic
Louisiana *		
Mississippi *	Jazz	
Oklahoma	Knicks	Nuggets
South Carolina *	Bulls	Celtics
Texas *		

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Ecological Inference

- Inferring individual behaviors from aggregate data (e.g., African American ballot rejections from county data)
- Precinct data is better, but not in EAVS dataset
- Related use cases
 - Determine the extent to which racial unfairness of voting processes has improved in pre-clearance states
 - Measuring quality of voting equipment, ballot rejection rates, etc.
 - Determine if voting unfairness is relevant for other groups (e.g., Hispanics)
 - Determine extent of racially polarized voting

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Data Needed for EI

- For your pre-clearance selected state, you need
 - County level election returns for the presidential election of 2024 and 2016
 - County percentage of population groups (black, Hispanic, white, etc.)
 - Numbers by county of
 - Ballots cast,
 - Ballot rejection rates
 - Polling places / population
 - Your measure of equipment quality

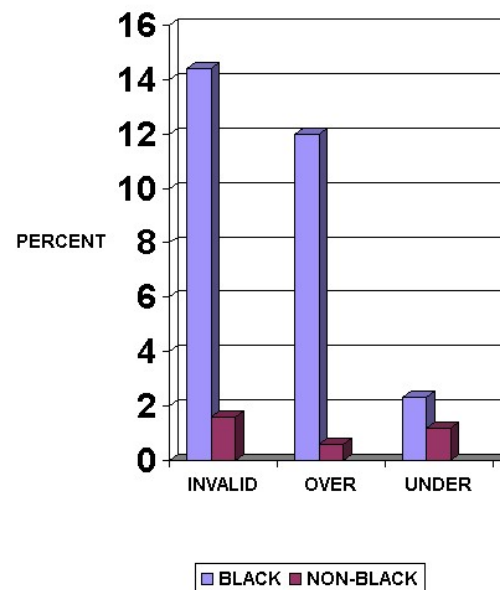
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EI Analysis Goals

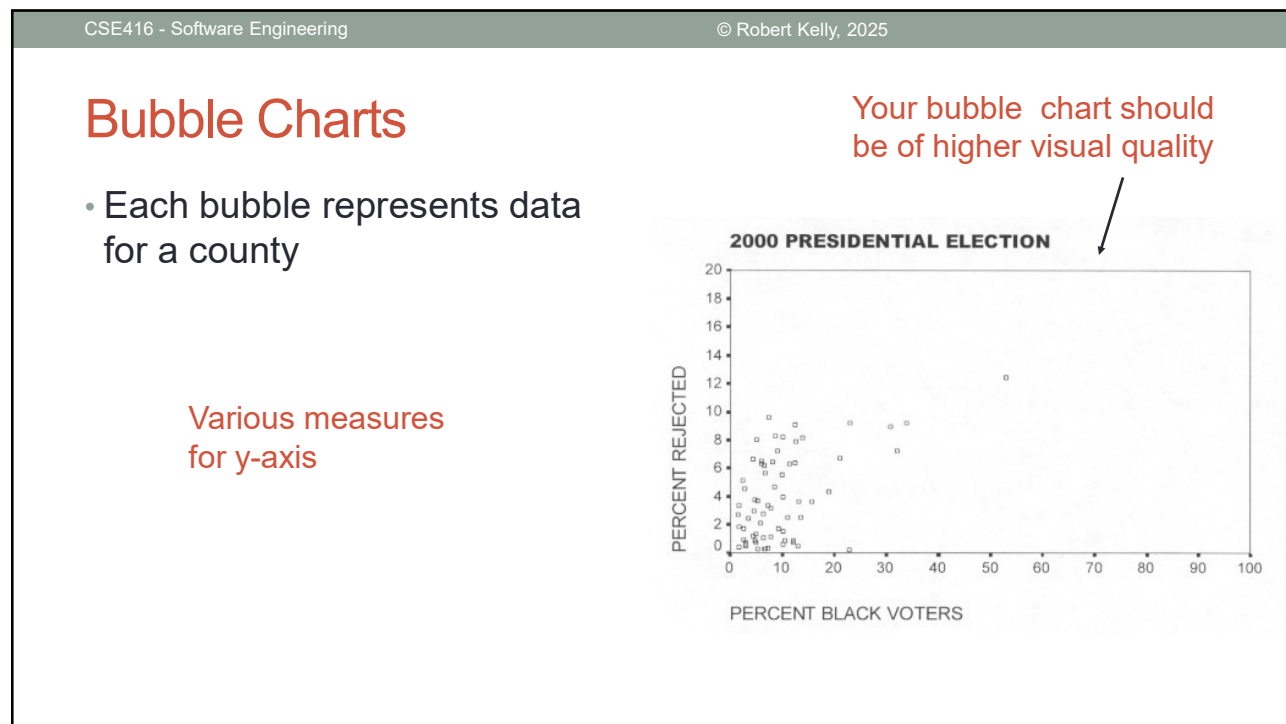
- Determine the extent to which African American ballot rejection rates have improved since 2000
- Determine continued improvement from 2016 to 2024

EI allows us to estimate rejection rates by race

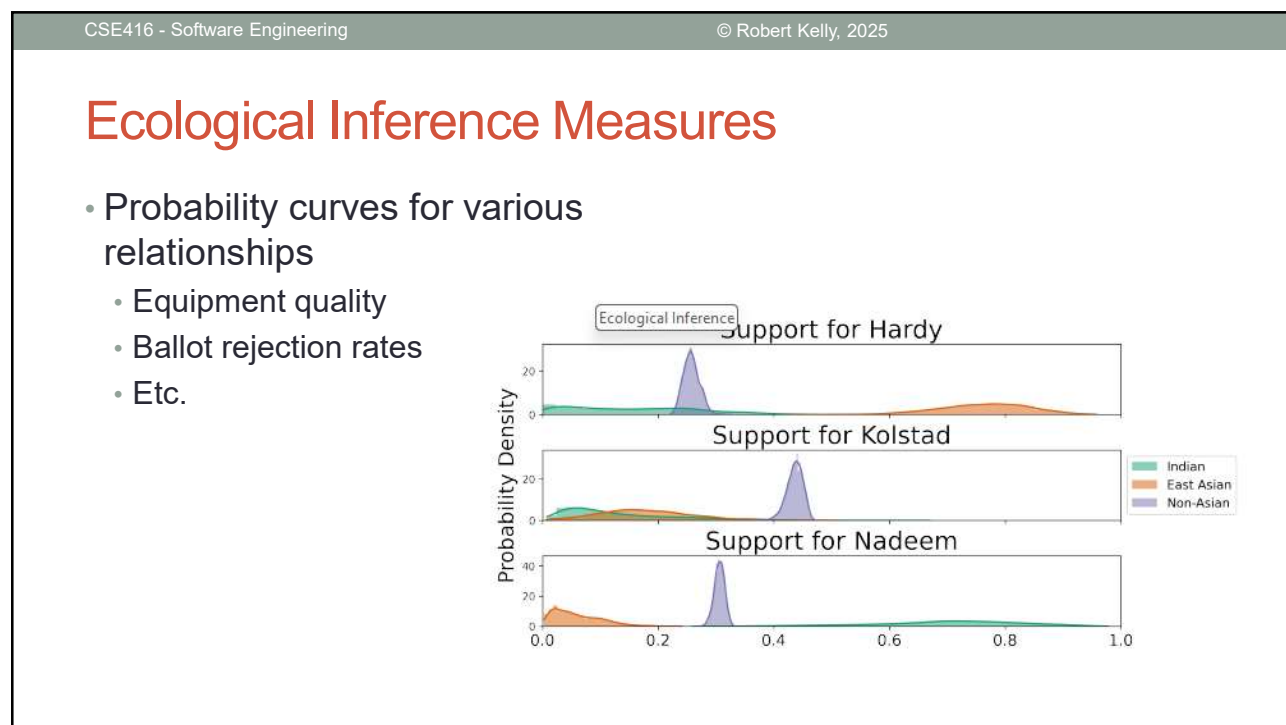
Florida 2000 Ballot Rejection Rates



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Have You Satisfied the Objectives?

- Understand the purpose of Ecological Inference (EI)
- Get started in using PyEI software for EI analysis
- Understand how to extend your GUI design to include charts for EI