The Panel Complexity of Sortition: Is 12 Angry Men Enough?

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What Is Sortition?

Delegating decisions to randomly selected panels.

Irish Citizens' Assembly (2016–2018): A 100-member panel proposed changes to abortion laws, culminating in a successful national referendum.

Why Use Sortition?

Elected parliaments fail to represent the population.

In the U.S. Congress (2023), nearly 50% of members are millionaires, compared to about 8% of the overall U.S. population.

Research Direction

Part 1: Definition of Representativeness

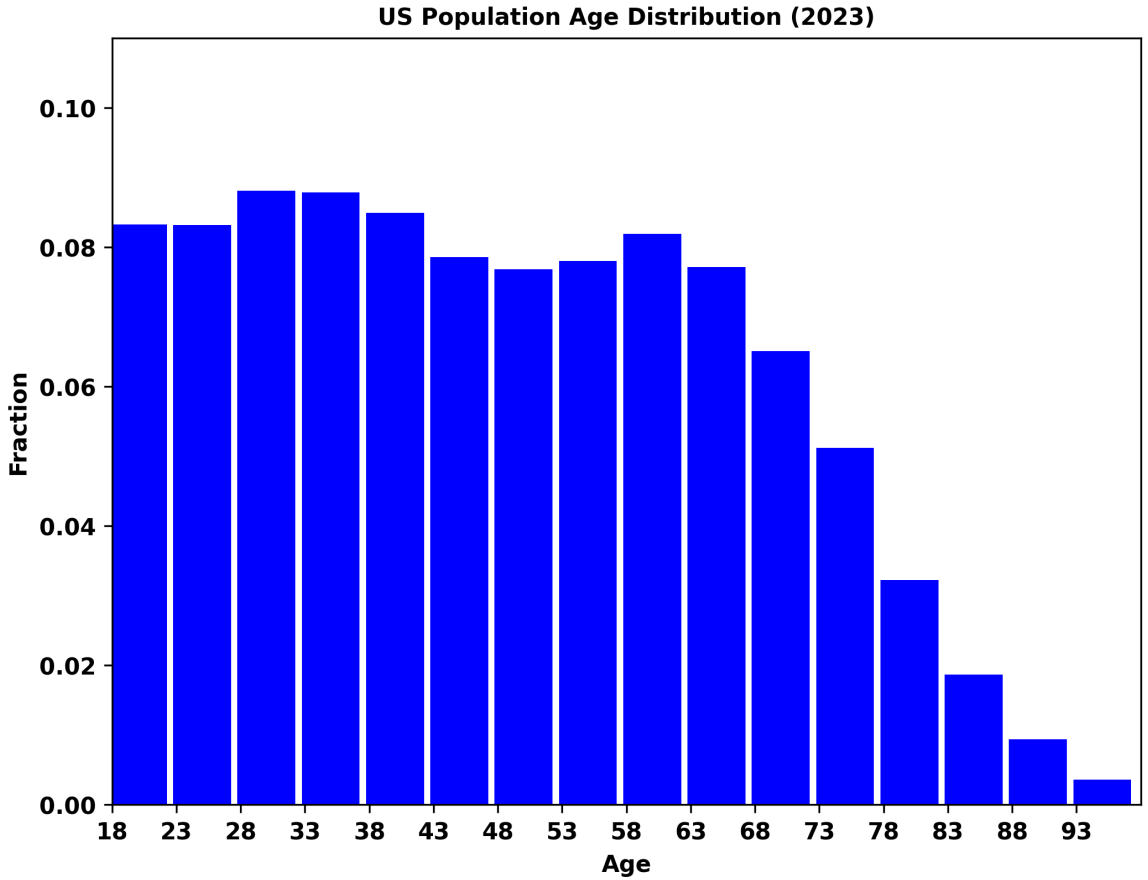
How to measure how well a panel represents the population?

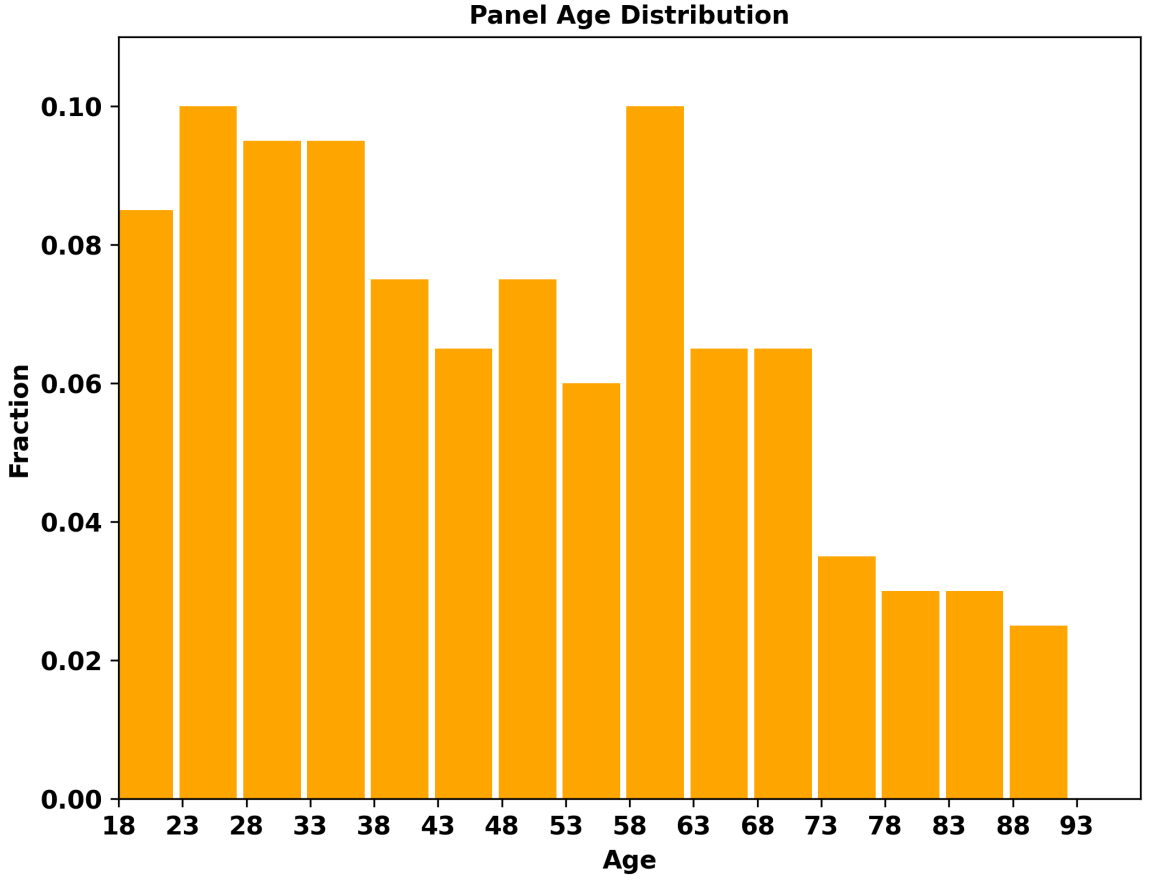
Part 2: Panel Complexity

What panel size is needed to make good decisions on behalf of the population?

Part 1: Definition of Representativeness

How to measure how well a panel represents the population?





Part 1: Definition of Representativeness

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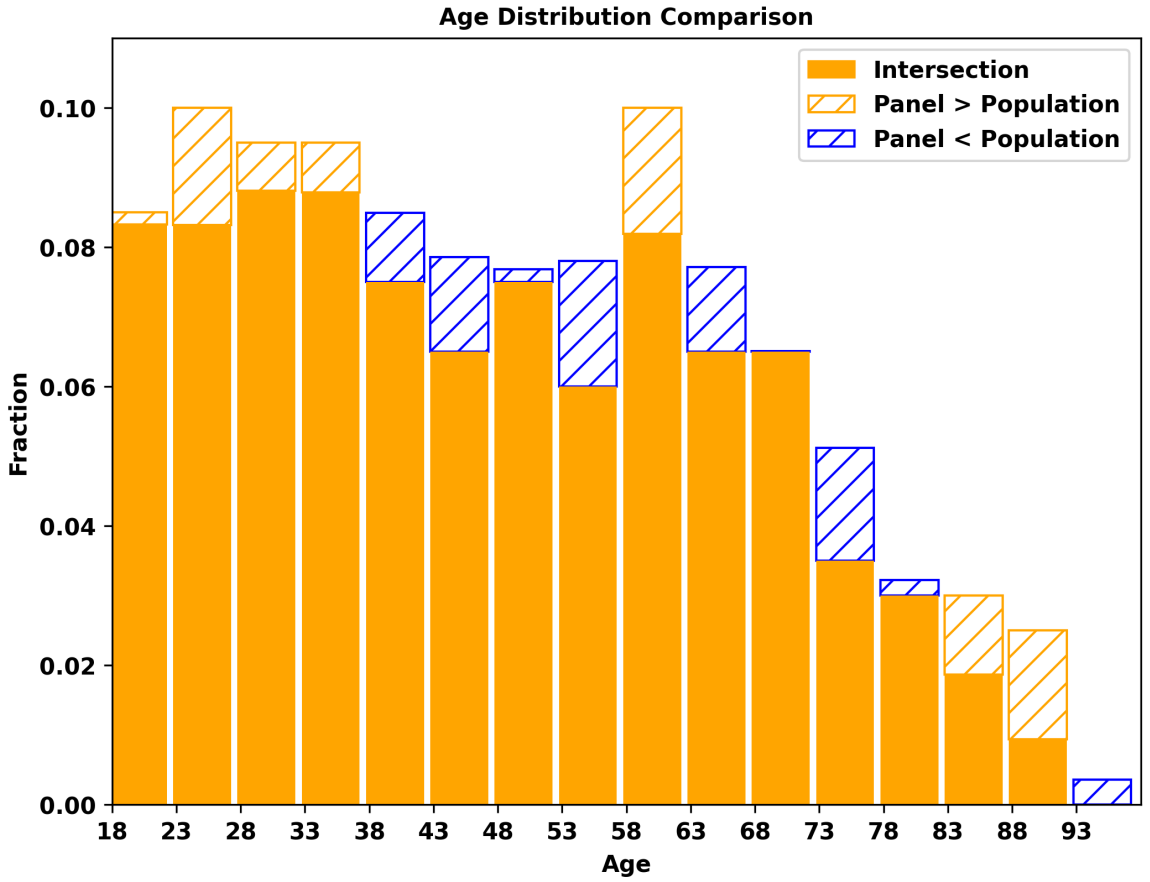


Wasserstein distance measures similarity between two probability distributions.

It captures representativeness for a given feature (such as age or income).

Properties of Wasserstein distance are central to our panel complexity analysis.

Part 2: Panel Complexity

What panel size is needed to make good decisions on behalf of the population?

In the U.S., juries typically have 12 members. But why 12?

Part 2: Panel Complexity

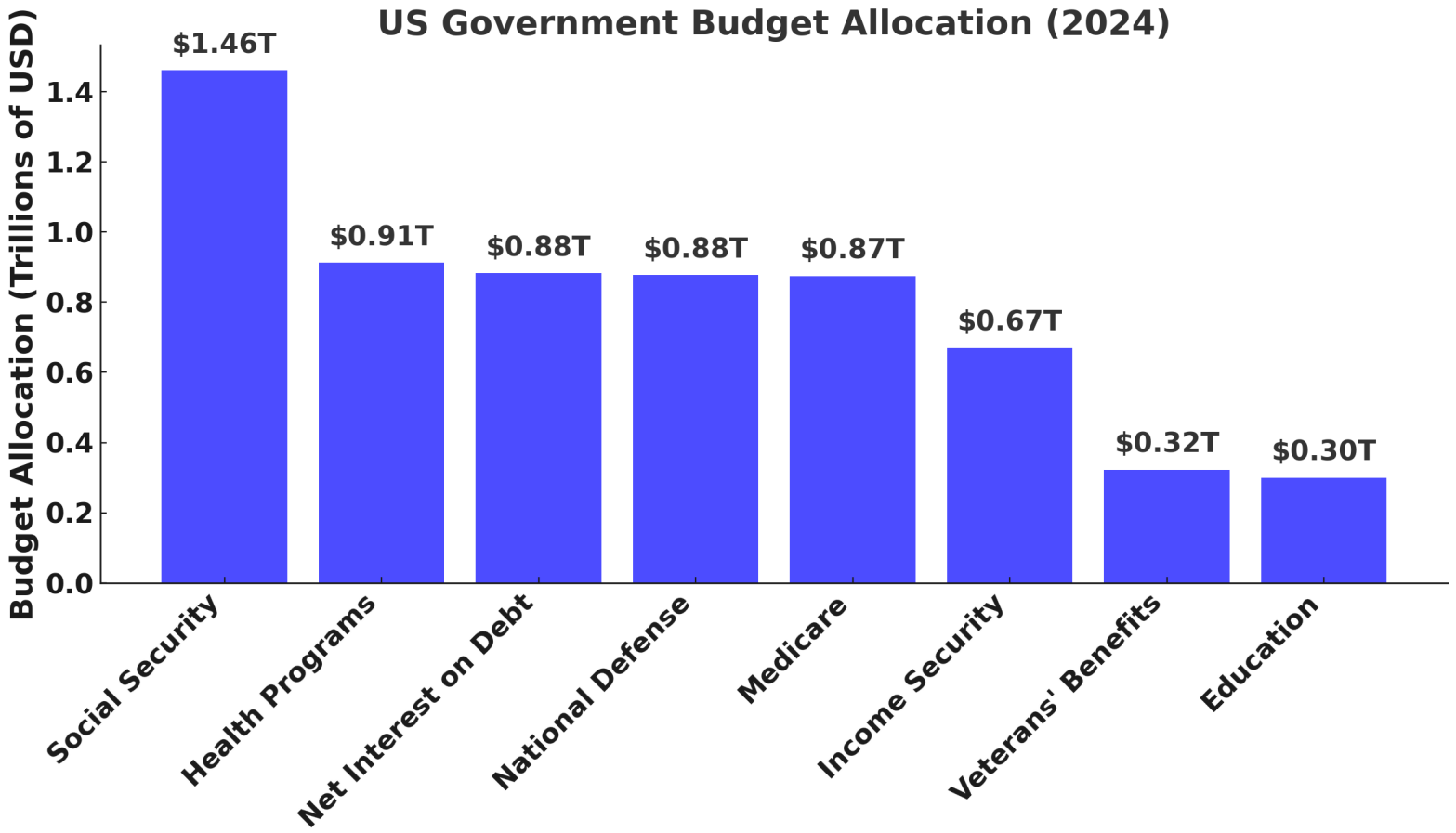
What panel size is needed to make good decisions on behalf of the population?

The judge and 12 jurors are mirroring Jesus and the 12 apostles.

One (Representative) Theorem

Social Choice Setting:

Consider a participatory budgeting problem with Lipschitz utilities.



One (Representative) Theorem

Social Choice Setting:
Consider a participatory budgeting problem with Lipschitz utilities.

Goal (Population Guarantee):
We want the expected social welfare to be within additive ϵ of optimum.

Assumption (Deliberation Guarantee):
Assume the panel allocates budget to maximize welfare of panel members.

Theorem (Panel Complexity):
It suffices to draw a uniformly random panel of size $\widetilde{\Theta}\left((1/\epsilon)^2 \cdot \#\text{categories}\right)$.

Open Problems

Open Problem #1: Study panel complexity for other social choice settings and other deliberation/population guarantees.

Open Problem #2: Analyze panel complexity for non-uniform panel selection methods.

Open Problem #3: Improve panel complexity bounds for small population size.

Thank you!