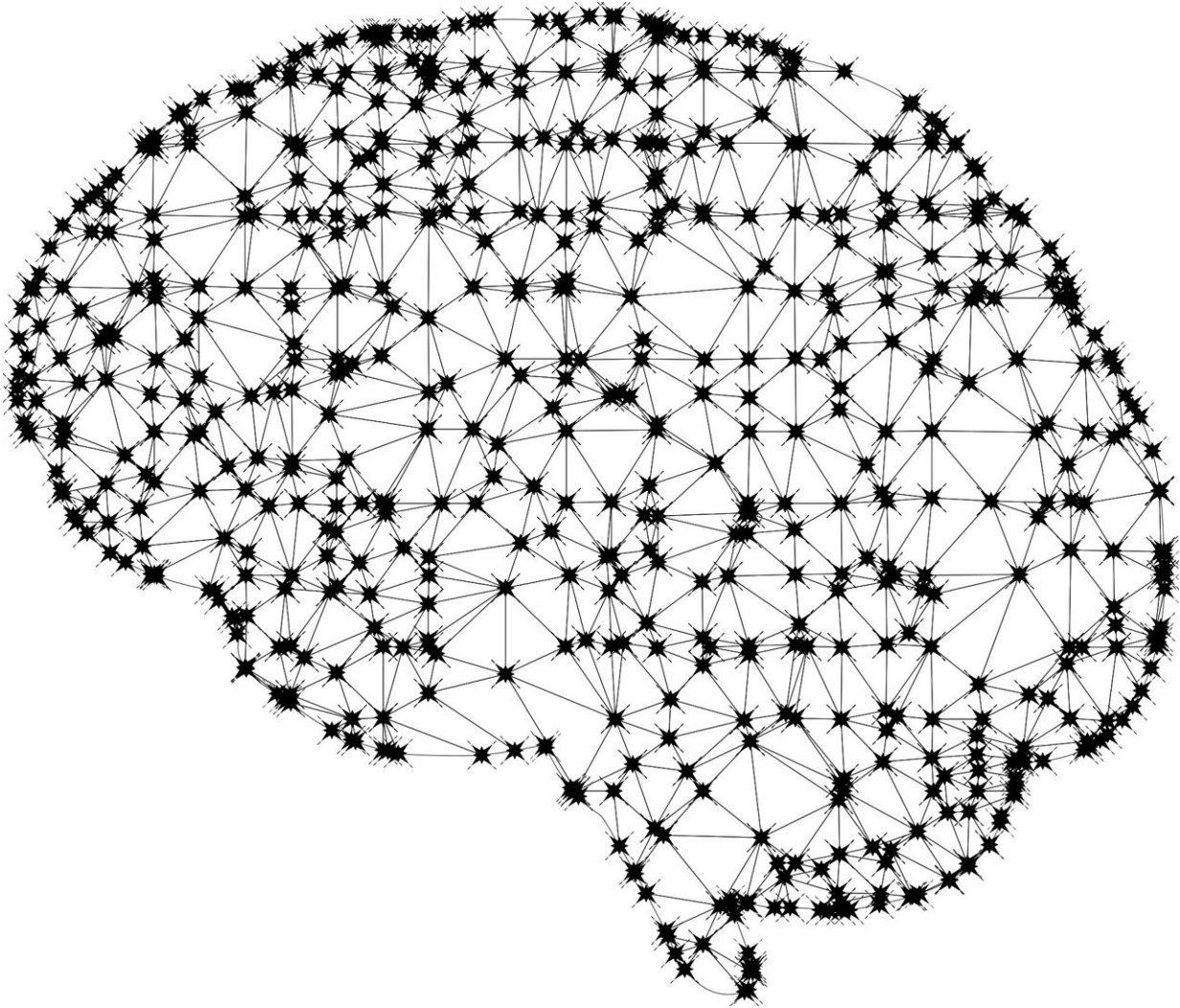# Can AI make democracy fairer?

August 4 2021

Credit: Pixabay/CC0 Public Domain

Democracy in ancient Athens looked quite different from democracies today. Instead of elections, most offices—including those in the legislature, governing councils, and magistrates—were filled by citizen volunteers, selected by random lottery. These citizens' assemblies drafted, debated, and passed laws; made major foreign policy decisions; and controlled military budgets.

Today, citizens' assemblies are making a comeback. In 2019 and 2020, citizens' assemblies in France and the UK convened to draft measures to address climate change. Citizens' assemblies in Ireland have led to changes to the Irish constitution which legalized abortion and same-sex marriage.

One of the biggest challenges in organizing these assemblies—both in ancient times and today—is deciding who should serve. The assembly needs to be representative of the population as a whole. But selection should be random—ideally, with all volunteers having an equal chance of being chosen.

To balance those two goals, the ancient Athenians used a rudimentary machine called a kleroterion, which randomly selected panels of volunteers from different tribes. Now, a team of computer scientists has devised a 21st century solution.

Now, a team of computer scientists from the Harvard John A. Paulson School of Engineering and Applied Sciences (SEAS) and Carnegie Mellon University, in collaboration with a practitioner from and the Sortition Foundation, have designed an assembly selection process that satisfies representation and fairness simultaneously.

This paper was published in *Nature*.

"Ideally, a citizens' assembly acts as a microcosm of society," said Ariel

Procaccia, Gordon McKay Professor of Computer Science at SEAS and co-author of the study. "Whether this goal is realized in practice, however, depends on exactly how assembly members are chosen."

"First, we need to ask how do we even think about fairness in the context of panel selection, and then how do we formalize it in a way that means that everyone gets a fair chance," said Bailey Flanigan, a graduate student at Carnegie Mellon University and co-author of the study."

The research team examined a typical two-stage assembly selection process. In the first stage, thousands of randomly selected people are invited to participate. The final assembly is chosen from the pool of volunteers using a selection algorithm. However, the pool of volunteers tends to be unrepresentative of the population as a whole because certain groups, such as those with more education, are more likely to volunteer.

"Giving all volunteers exactly equal probabilities is generally impossible to do while also satisfying demographic quotas," said Paul Gölz, a graduate student at Carnegie Mellon and co-author of the paper. "Our selection algorithm finds a panel that satisfies quotas while giving potential participants as equal a chance as possible of being selected."

It does this by computing a distribution over many panels, all of which satisfy the quota requirements, and then randomly drawing a panel from this distribution. A distribution of panels is then chosen in a way that the minimum probability of any volunteer appearing on the panel is as high as mathematically possible.

This open-source algorithm has already been used to select more than 40 citizens' assemblies around the world, by organizations in countries including Denmark, Germany, the U.S., Belgium, and the UK. Procaccia, along with his co-authors and Gili Rusak of Stanford University, developed a website called Panelot.org, which makes their

selection algorithm available free of charge.

Going forward, the researchers will continue working with practitioners to learn from their experience about how these new selection algorithms can be made even more useful.

"We are excited to explore new ways in which math and computer science can contribute to the practice of democracy," said Procaccia.

More information: Flanigan, B. et al, Fair algorithms for selecting citizens' assemblies, *Nature* (2021). DOI: 10.1038/s41586-021-03788-6

Provided by Harvard John A. Paulson School of Engineering and Applied Sciences