

The Role of Human Computation in AI

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What is AI?



Common view: Machines with human-like intelligence

Common fear: Humans displaced, lose jobs,
ultimately lose control

My Slice of AI

- AI opens up opportunities for humans and machines to **work together** to **achieve more** than either could achieve alone
- “Hybrid intelligence” takes advantage of the **complementary strengths** of humans and machines

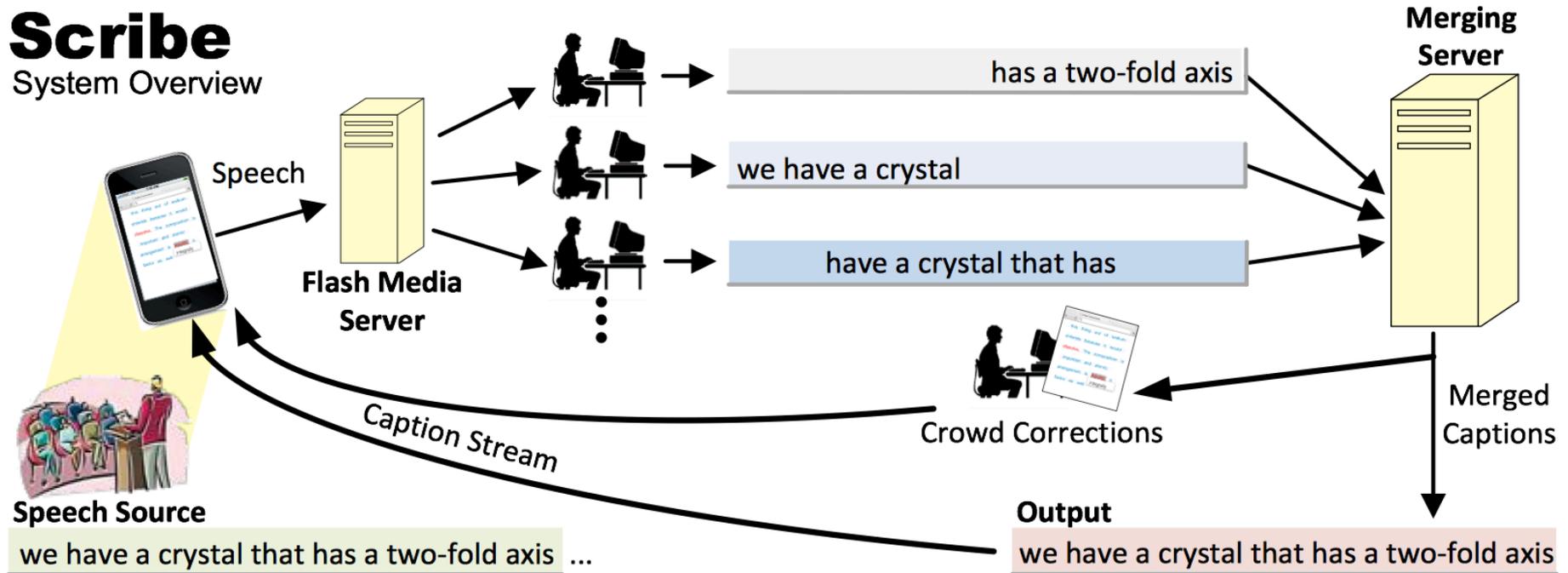
Crowd-Based Closed Captioning



Is it possible to provide real-time closed captioning of lectures, meetings, or other day-to-day conversations?

Crowd-Based Closed Captioning

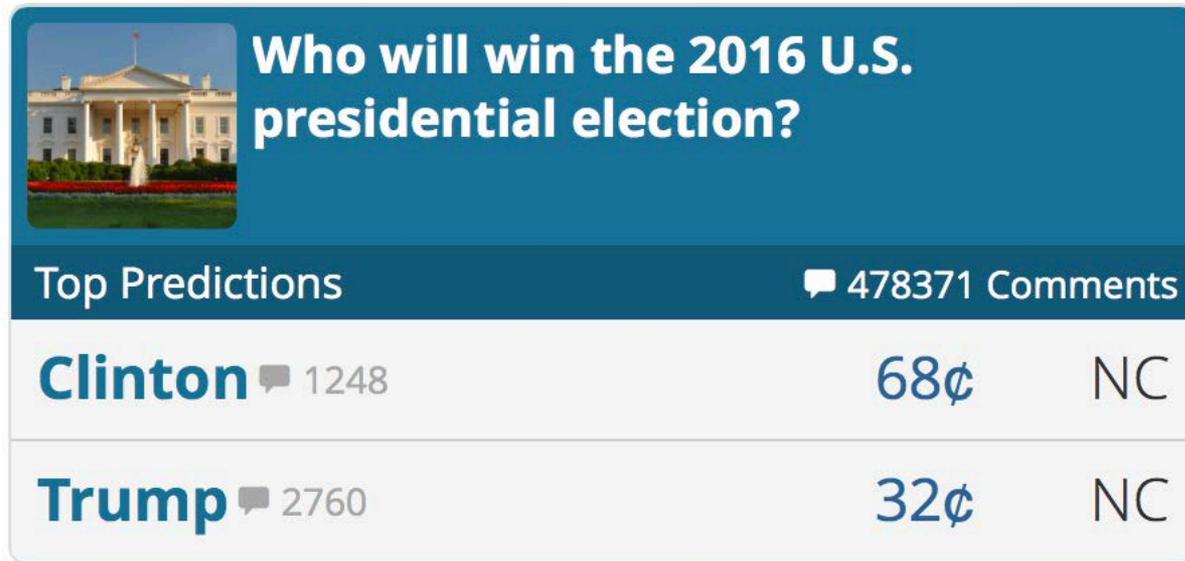
Scribe System Overview



[Lasecki, et al. 2012]

AI techniques can merge **real-time partial inputs** from **dynamic, untrained crowds** to outperform individuals

Combinatorial Prediction Markets



The screenshot shows a prediction market interface for the 2016 U.S. presidential election. At the top, there is a blue header with a photo of the White House and the text "Who will win the 2016 U.S. presidential election?". Below the header, there is a section for "Top Predictions" with "478371 Comments". The table below shows two candidates: Clinton and Trump. Clinton has 1248 comments, a price of 68¢, and is marked as "NC". Trump has 2760 comments, a price of 32¢, and is also marked as "NC".

Top Predictions		478371 Comments	
Clinton	1248	68¢	NC
Trump	2760	32¢	NC

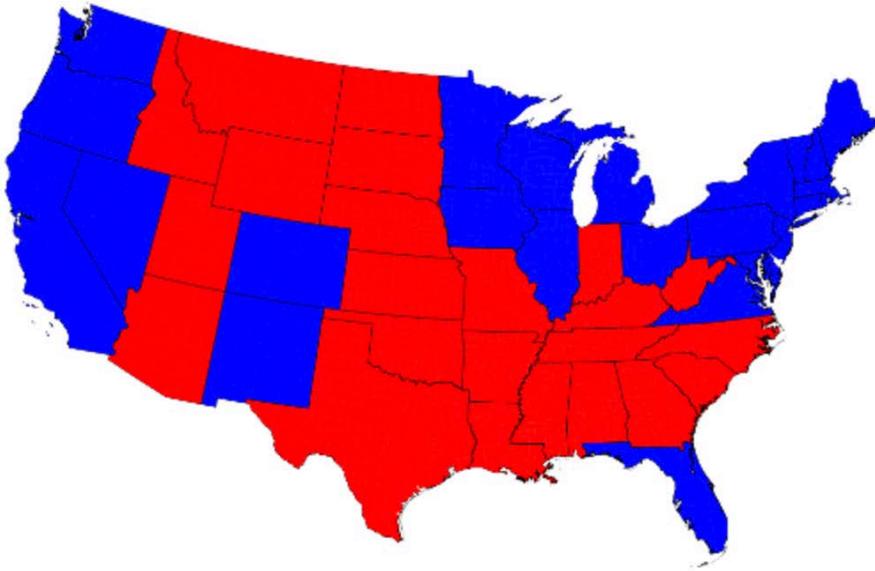
source:
PredictIt.org

Payoff is \$1 if Clinton wins. If probability of Clinton winning is x , I should

- Buy at any price less than $\$x$
- Sell at any price greater than $\$x$

Market price captures crowd's collective belief

Combinatorial Prediction Markets



*Chance of
Clinton winning
North Carolina?*

*Chance of Trump
winning Ohio or
Pennsylvania?*

Challenges: liquidity, computational issues, ...

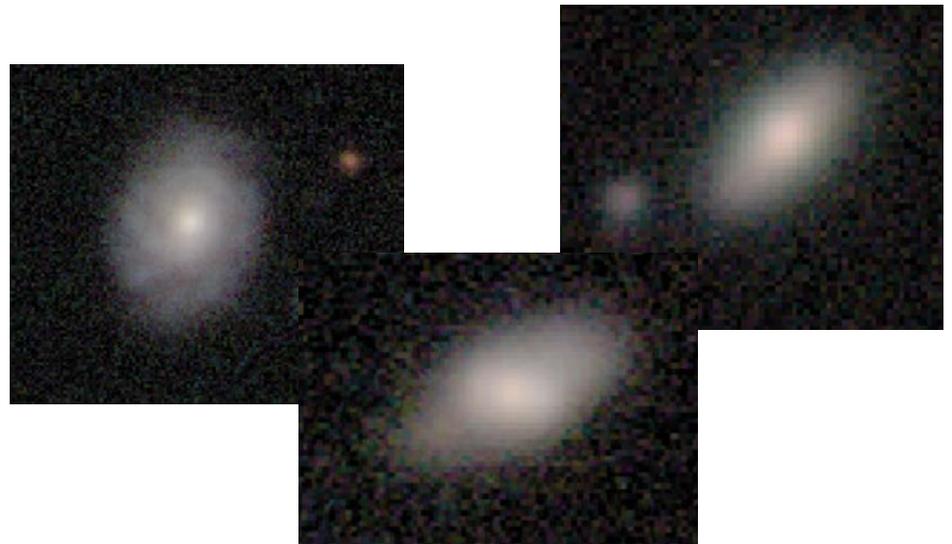
AI techniques can generate **coherent prices** (and therefore **coherent predictions**) over large, complex outcome spaces

Aggregating Judgments

How can we extract expert judgments from collections of amateur citizen scientists?



source: Caltech-UCSD Birds-200-2011



source: Galaxy Zoo

Aggregating Judgments

- Intelligent assignment
 - Assign more judges to difficult questions as needed
 - Assign judges to questions they are best at answering
- Intelligent aggregation
 - Infer accuracy of judges
 - Assign more weight to judges with high accuracy

AI allows people to **focus their effort** where it has the most impact and leads to **higher accuracy**

Take-aways

- Leveraging the **complementary strengths of humans and machines** allows us to solve problems that cannot be solved by AI alone
- AI systems with humans in the loop introduce new technical and social challenges

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