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
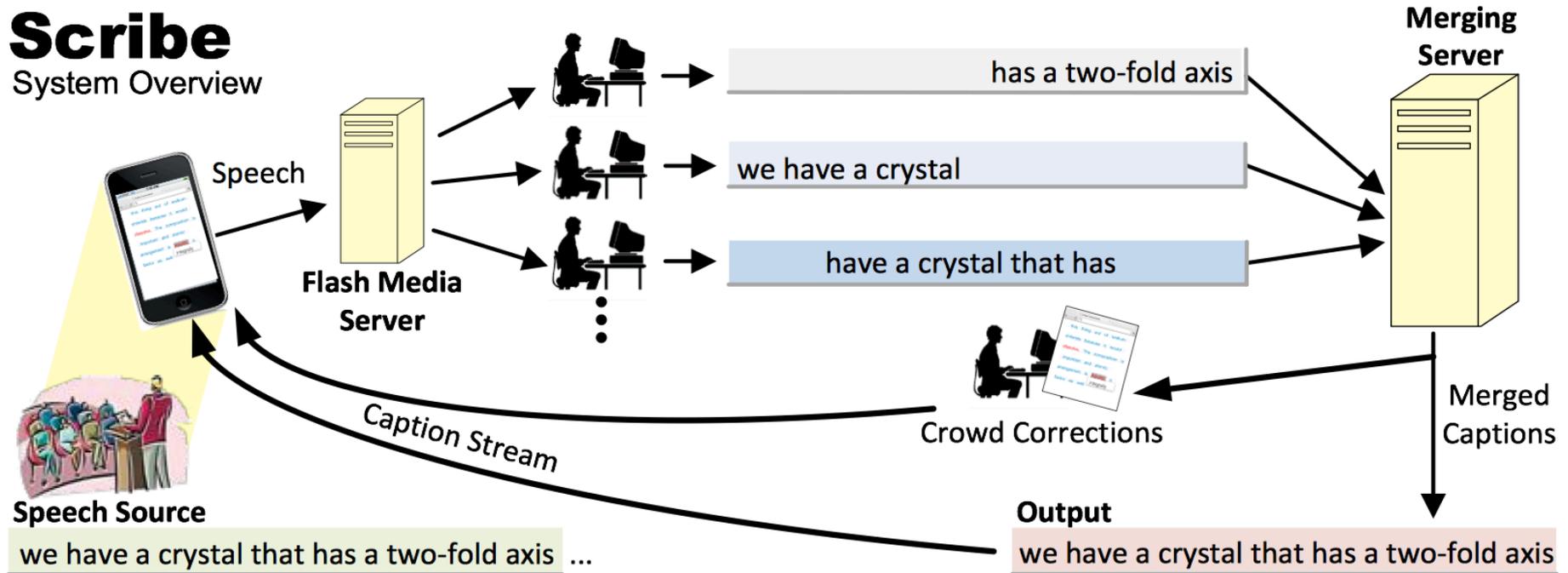
Crowd-Based Closed Captioning

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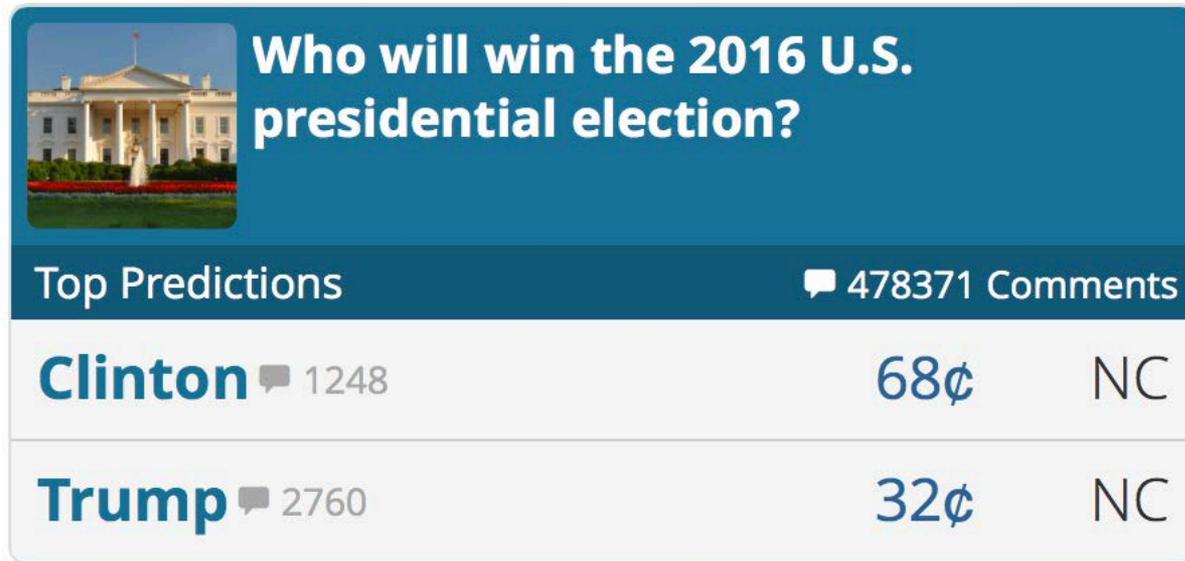
Crowd-Based Closed Captioning

[Lasecki, et al. 2012]

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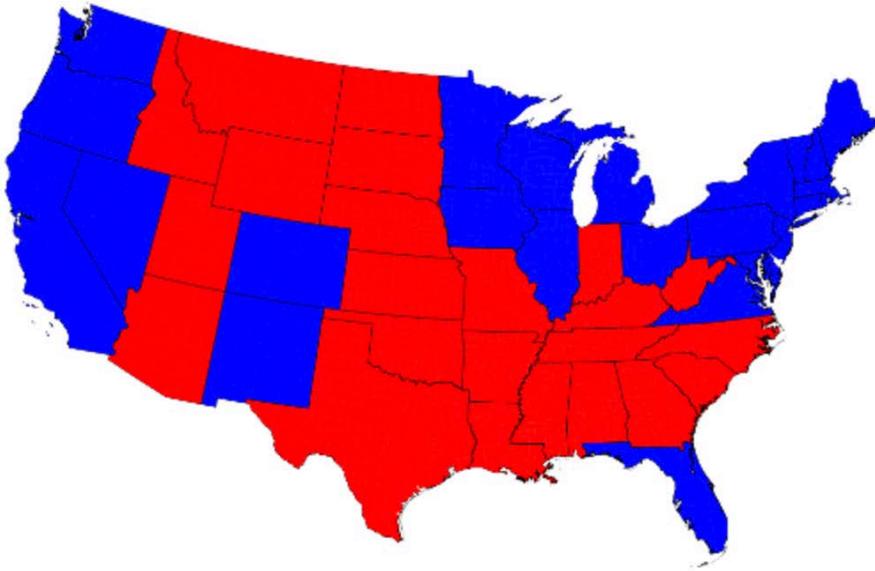
Combinatorial Prediction Markets

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?
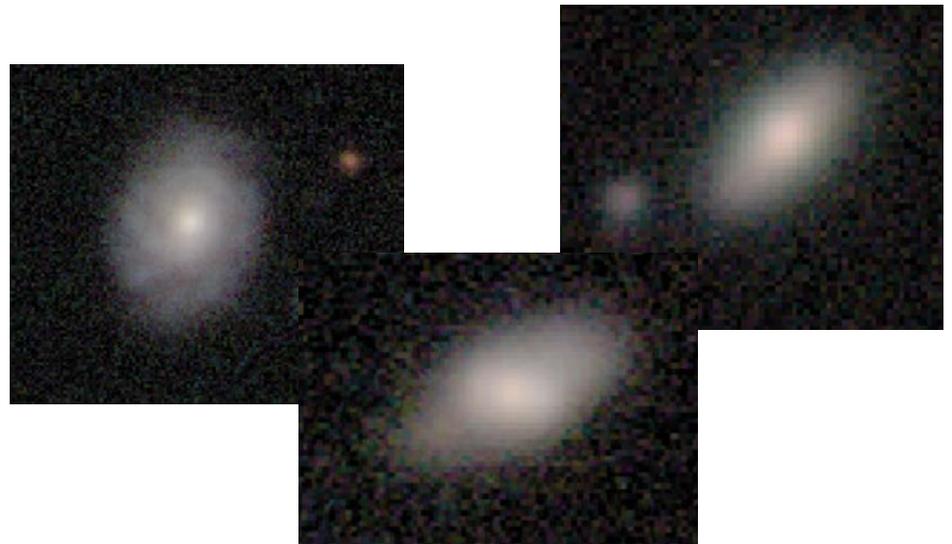
Challenges: liquidity, computational issues, …

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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