CSE 516A: Multi-Agent Systems

Introductory Lecture

Prof. Sanmay Das

Plan for today

Welcome & introductions

What is this class about?

Class logistics

What is this course?

Multi-agent system: a system where multiple autonomous entities with different information sets and goals interact.

Let’s see some examples of the kinds of things we’re going to study

medical school

+Sanmay

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Program of **Med**. in the Community hands-on practice since year 1.

Sponsored Search Auctions

Each sponsored search listing occupies a slot

Advertisers pay per-click

Google's problem: how to allocate slots

Advertiser's problem: how much to bid for a click

Key idea: must reason about the actions of other (intelligent) agents

Aside: Why does Google clearly delineate sponsored results?

Reasoning about others

Can I get two volunteers to play a game?

B's action

A's action

	Cooperate	Defect
Cooperate	1 year, 1 year	3 years, Free
Defect	Free, 3 years	2 years, 2 years

Time in prison for A, B

Golden Balls 1 Golden Balls 2 Radiolab

Best Medical Schools: Research

Ranked in 2017 | Best Medical Schools: Research Rankings Methodology

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Research rank	School name	Tuition	Total medical school enrollment	M s
#1	Harvard University Boston, MA	$58,050 (full-time)	720	
#2	Stanford University Stanford, CA	$54,327 (full-time)	487	
#3	Johns Hopkins University Baltimore, MD	$50,160 (full-time)	471	
#4	University of California—San Francisco San Francisco, CA	$33,420 (in-state, full-time); $45,665 (out-of-state, full-time)	633	
#5	University of Pennsylvania (Perelman) Philadelphia, PA	$54,036 (full-time)	629	
#6	Columbia University New York, NY	$57,634 (full-time)	660	
#7 Tie	Duke University Durham, NC	$55,180 (full-time)	478	
#7 Tie	Washington University in St. Louis St. Louis, MO	$60,798 (full-time)	507	

Incentives in voting

Polling for “top medical school”

3 candidates: Harvard, UCSF, JHU, WUSTL

Method: Rank candidates, assign 3,2,1,0 points

Person 1: Harvard > UCSF > WUSTL > JHU

Moments Ago
New York
ELECTION NIGHT IN AMERICA
4 HRS
42 MIN
36 SEC
ON CNN
BREAKING NEWS
TRUMP CASTS VOTE IN PRESIDENTIAL RACE
CNN
NAS ▲ 11.06
NEWSROOM

Incentives in voting

Polling for “top medical school”

3 candidates: Harvard, UCSF, JHU, WUSTL

Method: Rank candidates, assign 3,2,1,0 points

Person 1: Harvard > UCSF > WUSTL > JHU

You think: WUSTL > Harvard > UCSF > JHU

What would you do?

What happens when you graduate?

Apply to residencies

Alice	WUSTL > UCSF > Harvard	**WUSTL**	Chris > Alice > Bob
Bob	WUSTL > Harvard > UCSF	**UCSF**	Alice > Chris > Bob
Chris	Harvard > WUSTL > UCSF	**Harvard**	Alice > Chris > Bob

Suppose we match (Alice, UCSF), (Bob, WUSTL), (Chris, Harvard)?

Alice and WUSTL would rather be together than with their assigned matches: **unstable**

What about: (Alice, WUSTL), (Bob, UCSF), (Chris, Harvard) ?

QUARTZ

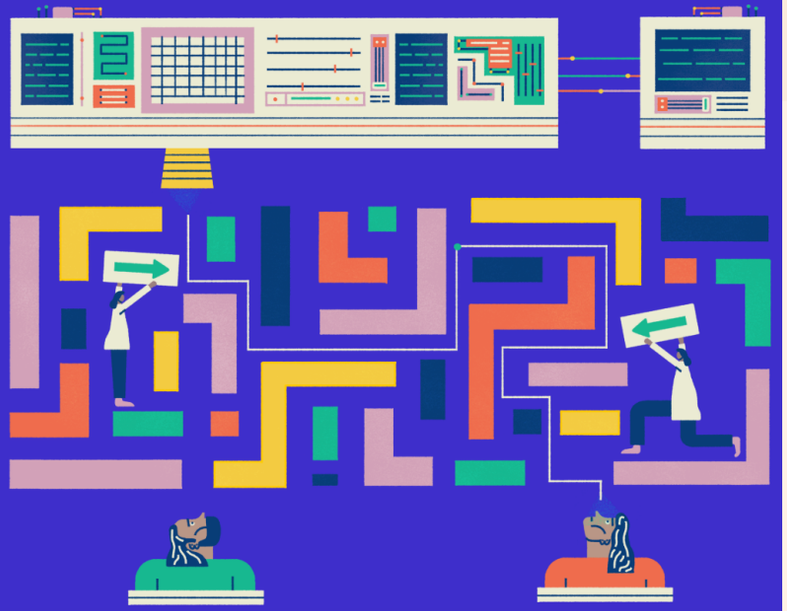
Prescription AI

This series explores the promise of AI to personalize, democratize, and advance medicine—and the dangers of letting machines make decisions.

THE BOTPERATING TABLE

How AI changed organ donation in the US

By Corinne Purtill • September 10, 2018



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Just the job: how AI is helping build a better life for refugees

Known as 'Annie', new software aim

Save

Helen Warrell NOVEMBER 20, 2018

If you had travelled thousands

Couples match

Participating in an NRMP **Match** as a **couple** allows two applicants to link their rank order lists, usually for purposes of obtaining positions in the same geographic location. ... A **couple** will **match** to the most preferred pair of programs on their rank order lists where each partner has been offered a position.

Couples in the Match - The Match, National Resident Matc...
www.nrmp.org › couples-in-the-match

CHART OF THE WEEK JANUARY 2, 2018

Making admissions more efficient

With economists' input, New York City developed a new admissions system that matched more students to high schools.
Bigstock

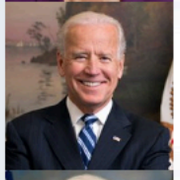
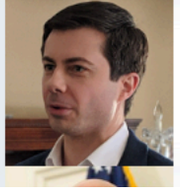
Just Allocations

Lots of work nowadays on Fairness, Accountability, Transparency, and Ethics (FATE) in AI

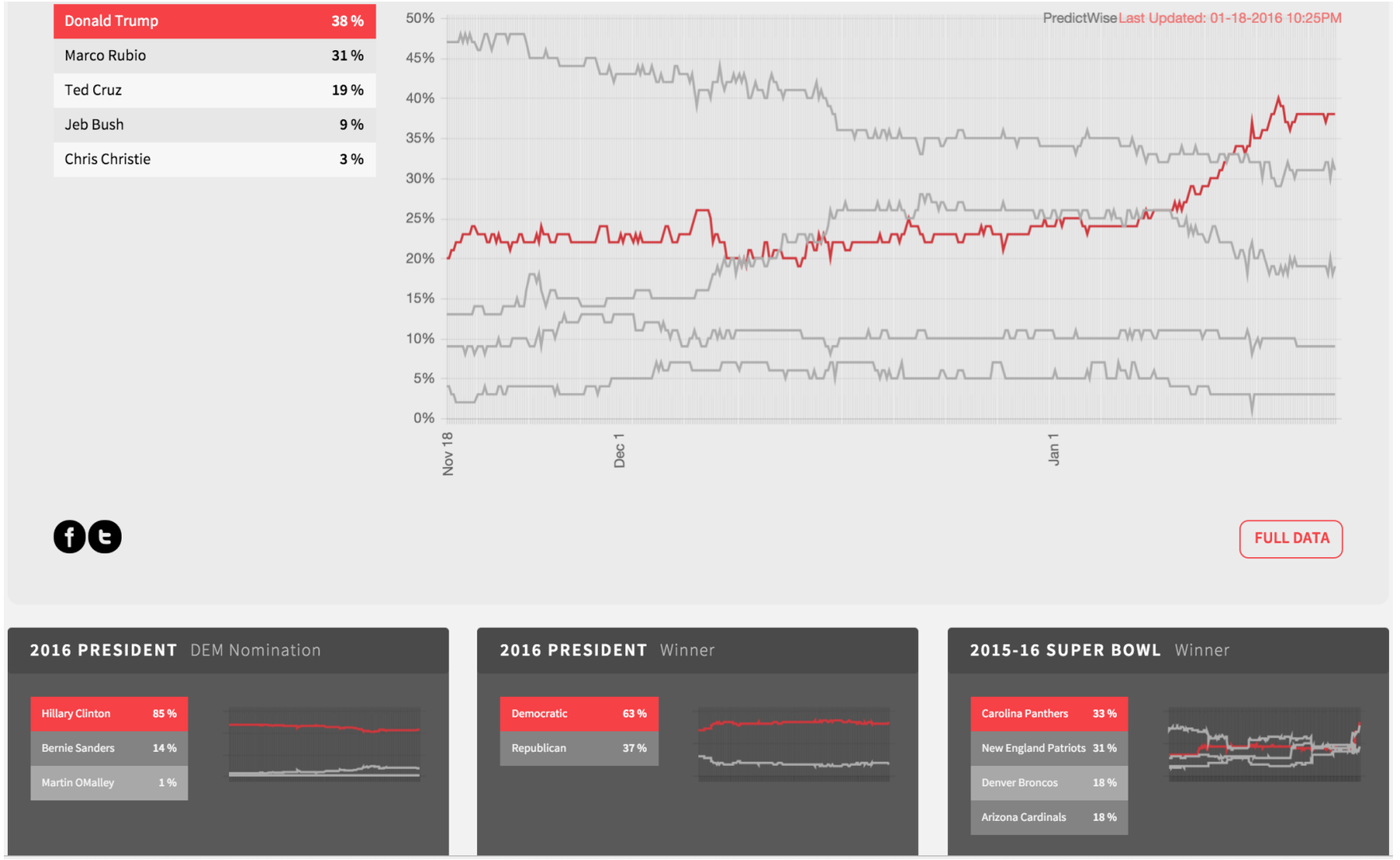
Related question in our context: *(Distributive / Social) Justice*

- How should goods, responsibilities, wealth, opportunities, and privileges be distributed among members of society?
- We will think about this in *local* contexts often characterized by non-market mechanisms

Who will win the 2020 Democratic presidential nomination?

	Contract	Latest Yes Price	Best Offer			Best Offer
	Elizabeth Warren	33¢ 2¢▲	33¢	Buy Yes	Buy No	69¢
	Joe Biden	26¢ 2¢▲	26¢	Buy Yes	Buy No	75¢
	Bernie Sanders	17¢ 1¢▲	17¢	Buy Yes	Buy No	84¢
	Andrew Yang	12¢ 1¢▲	12¢	Buy Yes	Buy No	89¢
	Kamala Harris	11¢ NC	12¢	Buy Yes	Buy No	89¢
	Pete Buttigieg	8¢ NC	9¢	Buy Yes	Buy No	92¢

In January 2016…



Where do these numbers come from?

A prediction market

Applies principles from information aggregation in financial markets to predicting event probabilities

Does it work? Why? What's the meaning of a stock price?

Syllabus and course logistics

Let’s look over the syllabus and discuss