

# 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

**Web**

News

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Images

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Search tools

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## Duke-NUS Medical School - Duke-NUS.edu.sg

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## Medical Schools - US News & World Report

[www.usnews.com/...schools/top-medical-scho...](http://www.usnews.com/...schools/top-medical-scho...) ▾ U.S. News & World Report ▾See the top ranked **medical schools** in primary care and research and find the best **medical school** for you at US News.

## Harvard Medical School - Harvard University

[hms.harvard.edu/](http://hms.harvard.edu/) ▾ Harvard Medical School ▾

Official site providing an overview of academic and research programs, resources, news and events, and links to other web sites located throughout the Harvard ...

## Best Medical Schools: Research - US News & World Report

[grad-schools.usnews.rankingsandreviews.com](http://grad-schools.usnews.rankingsandreviews.com) ▾ Graduate Schools ▾See the top ranked **medical schools** for research at US News. Use the best **medical school** rankings to find the best research program for you.**Ads**

## University of Nicosia

[nicosia.sgul.ac.cy/Apply-Now](http://nicosia.sgul.ac.cy/Apply-Now) ▾**Medical** Degree From St. George's  
2015 Admissions Now Open!

## UW School of Medicine

[www.uwmedicine.org/](http://www.uwmedicine.org/) ▾Ranked Number 1 in Primary Care  
by US News World Report

## Aruba medical school

[www.aureusuniversity.com/](http://www.aureusuniversity.com/) ▾Most Affordable, Highest Rated. No  
Mcat, US/Canada Residcy, USMLE Prep

## Top Caribbean Med School

[www.avalonu.org/](http://www.avalonu.org/) ▾Internationally Accredited. Best  
clinical rotations. MCI approved.

## UAG Medical School

[www.uag.edu/](http://www.uag.edu/) ▾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



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Research rank	School name	Tuition	Total medical school enrollment
#1	<a href="#">Harvard University</a> Boston, MA	\$49,875 (full-time)	700
#2	<a href="#">Stanford University</a> Stanford, CA	\$47,343 (full-time)	461
#3	<a href="#">Johns Hopkins University</a> Baltimore, MD	\$44,100 (full-time)	479
#4	<a href="#">University of California—San Francisco</a> San Francisco, CA	\$31,134 (in-state, full-time); \$43,379 (full-time) (out-of-state)	648
#4	<a href="#">University of Pennsylvania (Perelman)</a> Philadelphia, PA	\$47,090 (full-time)	646
#6	<a href="#">Washington University in St. Louis</a> St. Louis, MO	\$52,020 (full-time)	478

# 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 42 36  
HRS MIN 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

<b>Alice</b>	WUSTL > UCSF > Harvard	<b>WUSTL</b>	Chris > Alice > Bob
<b>Bob</b>	WUSTL > Harvard > UCSF	<b>UCSF</b>	Alice > Chris > Bob
<b>Chris</b>	Harvard > WUSTL > UCSF	<b>Harvard</b>	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) ?



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# Medical school

From Wikipedia, the free encyclopedia

*"Med school" redirects here. For the experimental music label, see [Hospital Records](#).*



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- This article **needs additional citations for [verification](#)**. (*April 2013*)
- This article **may require [cleanup](#) to meet Wikipedia's [quality standards](#)**. The specific problem is: **poorly worded**. (*April 2013*)

*See also:* [Medical education](#) and [List of medical schools](#)

A **medical school** is a [tertiary educational](#) institution—or part of such an institution—that teaches [medicine](#), and awards a professional degree for physicians and surgeons. Such degrees include the [Doctor of Medicine](#) (MD), [Doctor of Osteopathic Medicine](#) (DO), or [Bachelor of Medicine, Bachelor of Surgery](#) (BMBS, MBBS, MBChB). Many medical schools offer additional degrees, such as a [Doctor of Philosophy](#), [Master's degree](#), a [physician assistant](#) program, or other post-secondary education.

Medical schools can also employ medical researchers and operate hospitals. The entry criteria, structure, teaching methodology, and nature of medical programs offered at medical schools vary considerably around the world. Medical schools are often highly competitive, using standardized [entrance examinations](#) to narrow the selection criteria for candidates.



# Wikipedia and Peer Production

Why should I contribute?

How is quality maintained?

Can it be subverted?

- ★ Featured
- + New Arrivals
- ↕ Biggest Movers
- ⚡ Trending
- 👂 Most Predicted
- ⚠ Closing Soon

U.S. Elections

U.S. Politics


World

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## Trending

 **Trump tweets 1/11-1/18?**

Top Predictions 5465 Comments

35-39	34¢ ↑ 17¢
40-44	29¢ ↓ 5¢

 **Agriculture Secretary on 3/31?**


Top Predictions 4443 Comments

Perdue <span>2</span>	41¢ ↑ 5¢
Rastetter	14¢ ↓ 3¢

 **Secretary of State in 2017?**

Top Predictions 159902 Comments

Tillerson <span>358</span>	85¢ ↑ 1¢
Shannon <span>1</span>	8¢ ↑ 2¢

 **Putin-Trump U.S. meeting in first 100 days?**

Current Market 254 Comments

Yes	33¢ ↓ 2¢
No	67¢ ↑ 2¢

 **Direction of country on 1/16?**

Top Predictions 83 Comments

32.5+	99¢ ↑ 13¢
30.9-	1¢ NC

 **Obama RCP avg. approval 1/20/17?**


Top Predictions 795 Comments

55.0+	70¢ ↑ 21¢
54.0-54.9	27¢ ↓ 25¢

 **Next SCOTUS justice?**


Top Predictions 1074 Comments

Pryor <span>14</span>	31¢ ↑ 6¢
Sykes <span>4</span>	16¢ ↓ 1¢

 **Will Trump inauguration viewership exceed Obama's?**

Current Market 166 Comments

Yes	40¢ ↓ 2¢
No	60¢ ↑ 2¢

 **Congress approval on 1/16?**


Top Predictions 72 Comments

14.0-14.4	99¢ ↑ 8¢
13.9-	1¢ ↓ 5¢

 **Who will be elected president of France in 2017?**

Top Predictions 578 Comments

Fillon	55¢ ↓ 1¢
Le Pen <span>93</span>	36¢ ↓ 3¢

 **"Acting" cabinet members on Jan. 31?**

Top Predictions 327 Comments

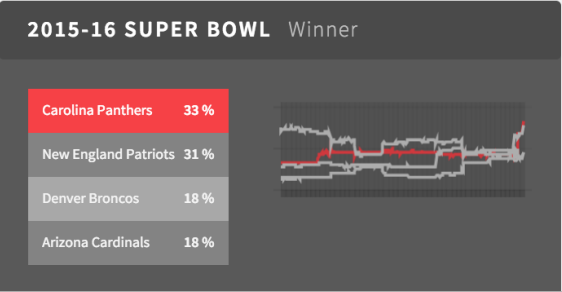
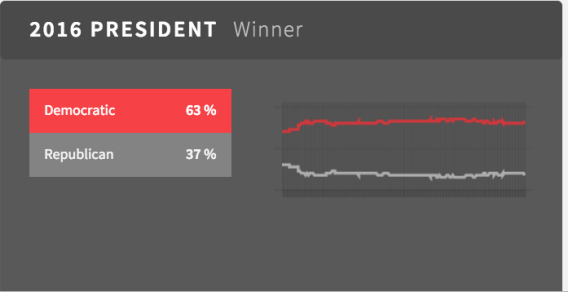
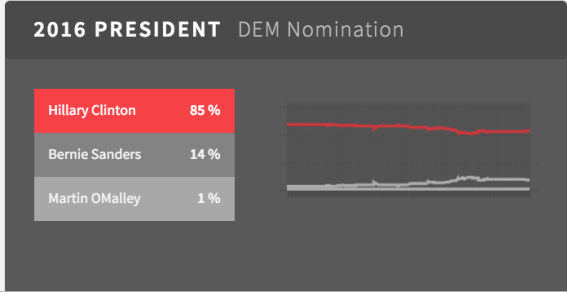
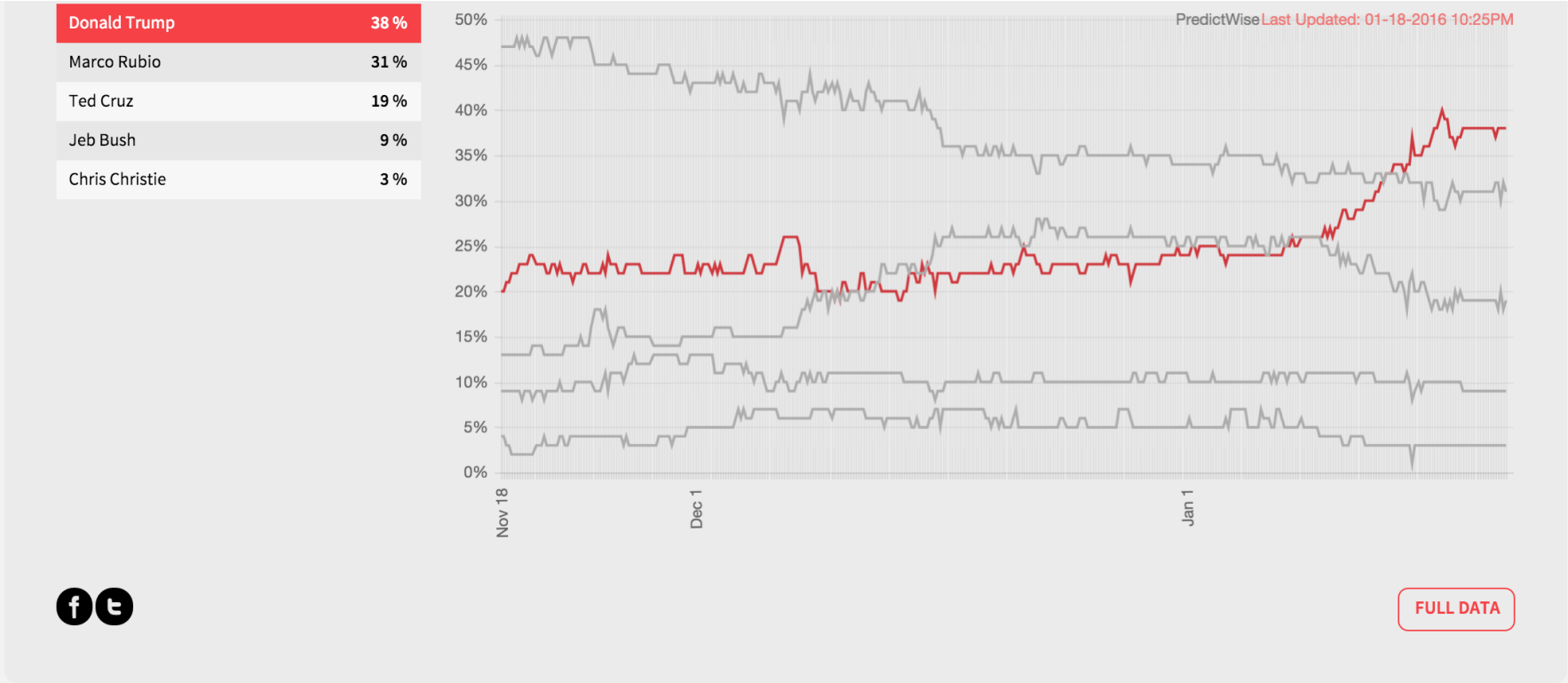
5+ <span>13</span>	70¢ ↓ 1¢
4	20¢ ↑ 1¢

 **Will Obama pardon Manning?**

Current Market 227 Comments

Yes	37¢ ↓ 4¢
No	63¢ ↑ 4¢

# One year ago...



# 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