

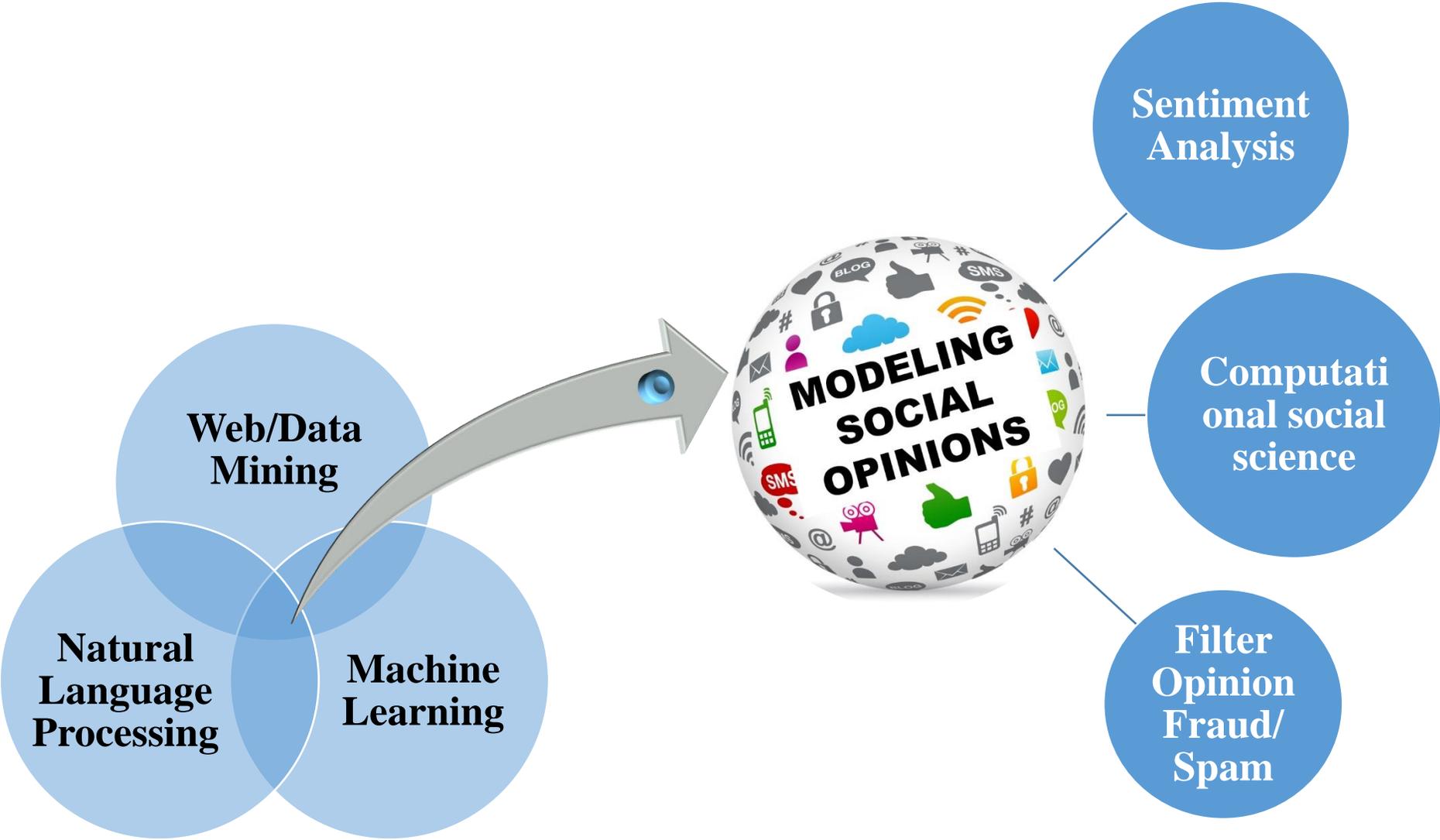
Research Overview

Arjun Mukherjee
University of Houston
September 30, 2014

Goal

- **(1) Mine and analyze social media + user's interaction with the Web**
- **(2) Characterize user behaviors, language and sentiments in social media to predict socio-psychological indices:**
 - Gender, age, mood, agreement/disagreement etc.**
 - Socio-economic indices (e.g., stock markets)**
 - Deception and Fraud (e.g, fake review, identities, sockpuppets)**
- **Using language and user behaviors in social media.**

Research Areas



Outline

□ Introduction – Motivation

 □ **Problem#1: Modeling debate conversations [KDD'12; ACL'13]**

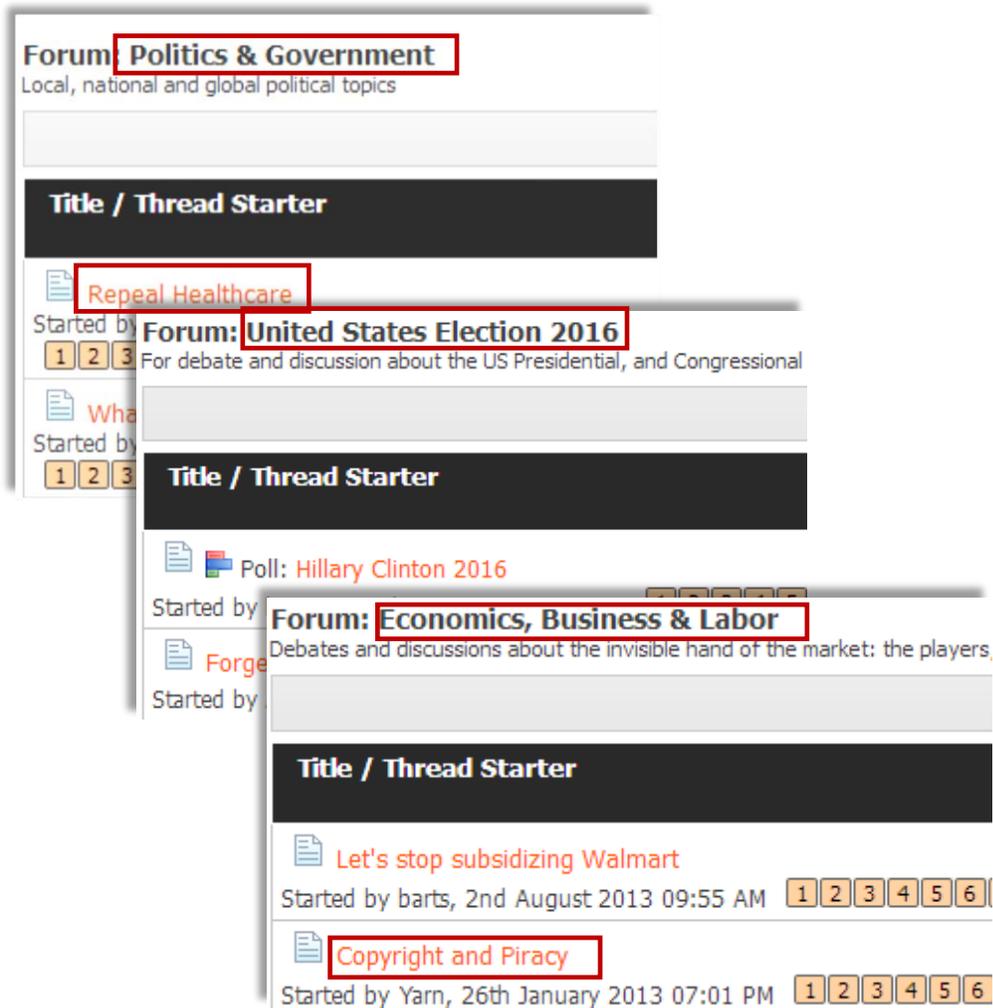
□ **Problem#2: Social Sentiment \Rightarrow Stock Prediction [ACL'13]**

□ **Problem#3: Deceptive opinion fraud/spam [KDD'13, WWW'12]**

Modeling social debates

Input: 1.2 M non-stop words,
100,000+ debate posts

Output: Latent topics, A/D sentiment
expressions



Topics

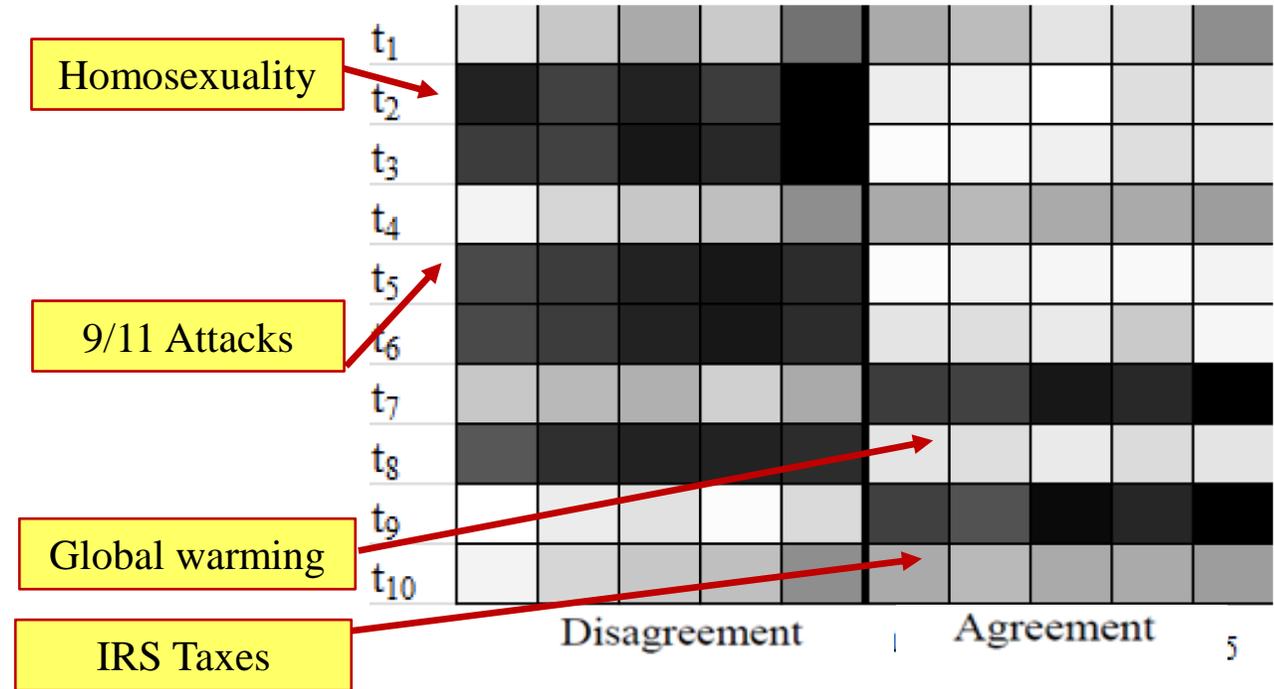
t7: Global warming	t8: Vegetarianism	t9: IRS/Taxes	t10: U.S. Politics
earth	animals	tax	vote
co2	meat	government	president
warming	egg	irs	democrats
weather	beef	state	politics
pollution	slaughter	money	electoral
global warming	kill	pay	us government
floods	life	federal	obama
ice	diet	state taxes	policy
nuclear waste	meat industry	services	elections
sea level	vegan	social security	senate
climate change	vegetables	income tax	libertarian
arctic ice	meat consumption	budget	left wing

A/D Sentiments

Agreement	Disagreement
I agree	I disagree
indeed correct	I reject
I accept	<i>I would disagree</i>
claim	<i>I don't buy your</i>
<i>I concede</i>	really
<i>is valid</i>	<i>I really doubt</i>
<i>I do support</i>	<i>can you prove</i>
<i>rightly said</i>	argument fails
<i>completely agree</i>	<i>you fail to</i>
<i>very well put</i>	<i>contradict yourself</i>
<i>point taken</i>	<i>you don't understand</i>

Why do we care?

- **Q: How do people feel about taxes, terrorism?**
- Useful for policy, bills, campaigns
- Data: Online debate/discussions (Volconvo.com)

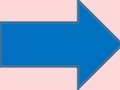


Sentiments

<p>I disagree I reject <i>I would disagree</i> <i>I don't buy your really</i> <i>I really doubt</i> <i>can you prove</i> argument fails <i>you fail to</i> <i>contradict yourself</i> <i>you don't understand</i></p>	<p>I agree indeed correct I accept claim <i>I concede</i> <i>is valid</i> <i>I do support</i> <i>rightly said</i> <i>completely agree</i> <i>very well put</i> <i>point taken</i></p>
---	--

Sentiment heat map of social topics

Outline

- Introduction – Motivation
- Problem#1: Modeling debate conversations [KDD'12; ACL'13]
-  □ Problem#2: Social Sentiment \Rightarrow Stock Prediction [ACL'13]
- Problem#3: Deceptive opinion fraud/spam [KDD'13, WWW'12]

Decision Making using Social Sentiment

- Stock tweets

 “\$AAPL is **loosing** customers. everybody is buying android phones! \$GOOG.”
“I think \$AAPL is signaling a **huge drop** that will come in the mkt...”

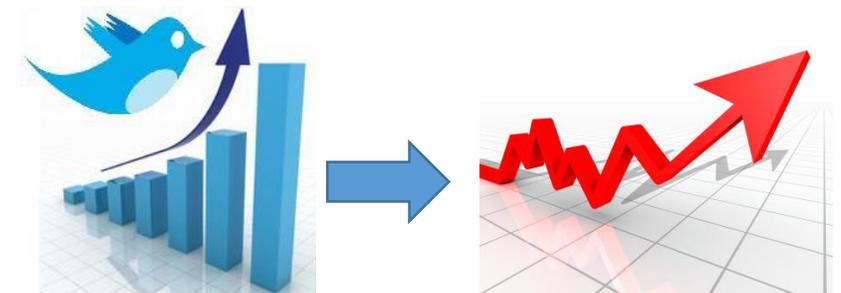
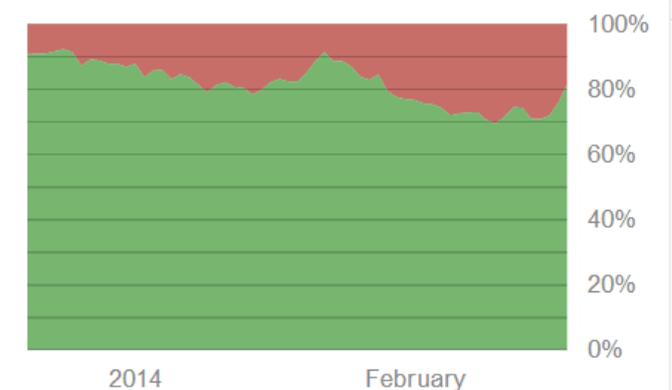
- Dedicated message boards:
Stocktwits, marketwatch, Yahoo! Finance

- **Social sentiment ↔ Stock Market**

- **Q: How to use social sentiment to make decisions?**

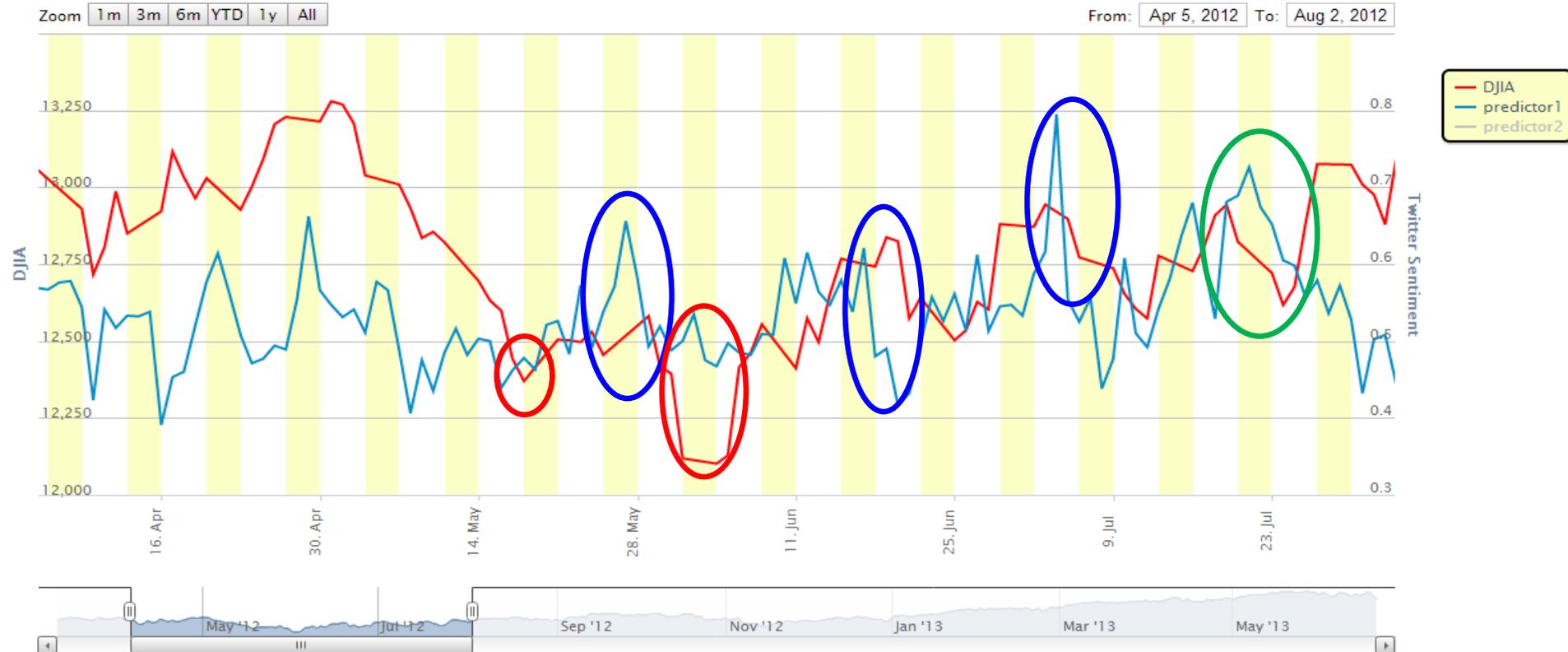
\$GOOG Sentiment

82% BULLISH 18% BEARISH



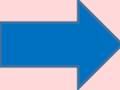
An Interesting Pattern

Daily Prediction: Dow Jones Industrial Average (DJIA) v.s. Twitter Sentiment
Source: Yahoo! Finance & Twitter.com



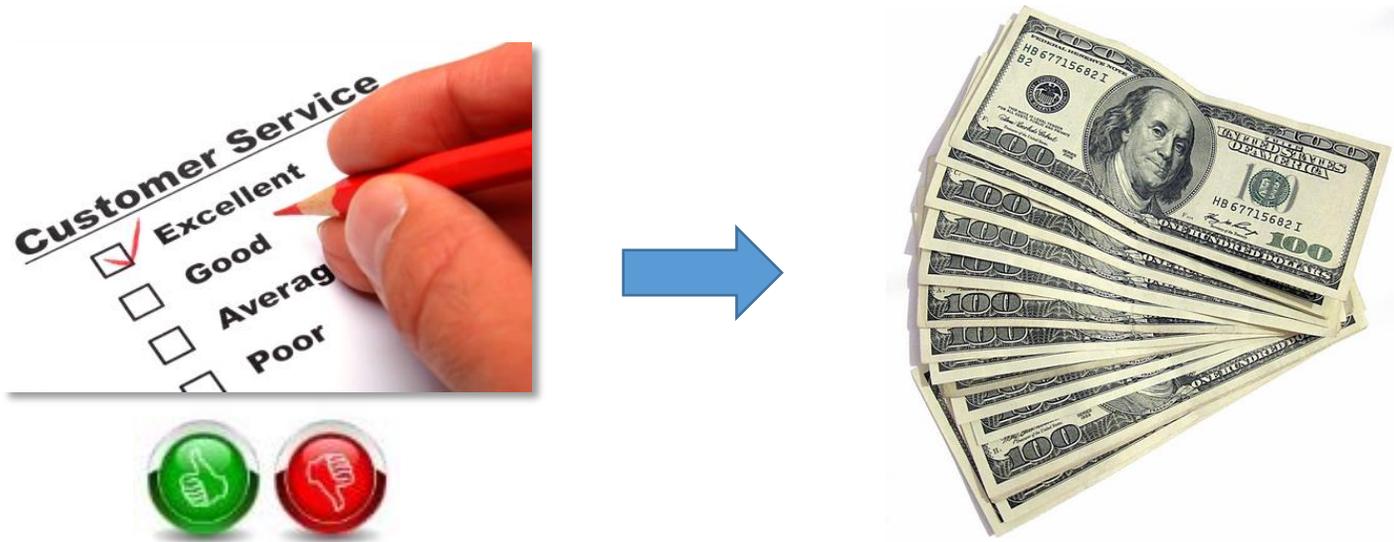
- Pos/Neg sentiment ratio's trend dovetails with market's trend
- **Social Mood ↔ Financial Gains**
- **Q: Can we do better?**

Outline

- Introduction – Motivation
- Problem#1: Modeling debate conversations [KDD'12; ACL'13]
- Problem#2: Social Sentiment \Rightarrow Stock Prediction [ACL'13]
-  □ Problem#3: Deceptive opinion fraud/spam [KDD'13, WWW'12]

The Opinion Curse – Opinion Spam!

- Opinions \Rightarrow Virtual Currency



- Opinion Spam: Illegitimate activities (e.g., writing fake reviews/ratings) to deliberately mislead consumers
- In E-commerce, filtering opinion spam is vital



Group Opinion Spam on Amazon.com

<p>1 of 1 people found the following review helpful: ★★★★★ Practically FREE music, December 4, 2004 This review is from: Audio Xtract (CD-ROM) I can't believe for \$10 (after rebate) I got a program that gets me free unlimited music. I was hoping it did half what was</p>	<p>2 of 2 people found the following review helpful: ★★★★★ Like a tape recorder..., December 8, 2004 This review is from: Audio Xtract (CD-ROM) This software really rocks. I can set the program to record music all day long and just let it go. I come home and my</p>	<p>★★★★★ Wow, internet music! ..., December 4, 2004 This review is from: Audio Xtract (CD-ROM) I looked forever for a way to record internet music. My way took a long time and many steps (frustrating). Then I found Audio Xtract. With more than 3,000 songs downloaded in ...</p>
<p>3 of 8 people found the following review helpful: ★★★★★ Yes – it really works, December 4, 2004 This review is from: Audio Xtract Pro (CD-ROM) See my review for Audio Xtract - this PRO is even better. This is the solution I've been looking for. After buying iTunes,</p>	<p>3 of 10 people found the following review helpful: ★★★★★ This is even better than..., December 8, 2004 This review is from: Audio Xtract Pro (CD-ROM) Let me tell you, this has to be one of the coolest products ever on the market. Record 8 internet radio stations at once,</p>	<p>2 of 9 people found the following review helpful: ★★★★★ Best music just got ..., December 4, 2004 This review is from: Audio Xtract Pro (CD-ROM) The other day I upgraded to this TOP NOTCH product. Everyone who loves music needs to get it from Internet</p>
<p>5 of 5 people found the following review helpful: ★★★★★ My kids love it, December 4, 2004 This review is from: Pond Aquarium 3D Deluxe Edition This was a bargain at \$20 - better than the other ones that have no above water scenes. My kids get a kick out of the</p>	<p>5 of 5 people found the following review helpful: ★★★★★ For the price you..., December 8, 2004 This review is from: Pond Aquarium 3D Deluxe Edition This is one of the coolest screensavers I have ever seen, the fish move realistically, the environments look real, and the</p>	<p>3 of 3 people found the following review helpful: ★★★★★ Cool, looks great..., December 4, 2004 This review is from: Pond Aquarium 3D Deluxe Edition We have this set up on the PC at home and it looks GREAT. The fish and the scenes are really neat. Friends and family</p>

Figure 1: Big John's Profile

Figure 2: Cletus' Profile

Figure 3: Jake's Profile

- All reviewed same 3 products giving all 5-stars + 100% helpfulness votes!.
- All reviews posted in a time window of 4 days
- Each only reviewed those 3 products,
- **Unlikely to be coincidental- Something seems fishy!**

Research Areas I work on...

- Join me as an RA!
- Email for more info: arjun@cs.uh.edu

