Crowdsourcing and Human Computation

Class time: MW 4:30-6

Instructor: Chris Callison-Burch
TA: Ellie Pavlick

Office hours: TBD

Website: crowdsourcing-class.org

Inter-related concepts

"A paradigm for utilizing human processing power to solve problems that computers cannot yet solve."

"Outsourcing a job traditionally performed by an employee to an undefined, generally large group of people via open call."

"Applications that facilitate collective action and social interaction online with rich exchange of information and evolution of aggregate knowledge."

"Groups of individuals doing things collectively that seem intelligent"

"Applying algorithms to extract patterns from data."

Francis Galton

If you guess the right number of jellybeans,
you may win a prize.

Collective Intelligence?

Group Think

Mob Mentality

Popular Delusions and the Madness of Crowds

- Economic bubbles
- Alchemy & Psuedoscience
- Witch hunts
- Prophecies

Wisdom of Crowds

Requirements for a crowds to be wise

- Diversity of Opinion
- Independence
- De-centralization
- Aggregation

Groups / Crowds

- Employees of a business
- Participants in a poll
- Sports fans betting on games
- Independent stock market investors
- Internet users linking to sites
- Citizens in a democracy

Ways of aggregating collective intelligence

- Point spreads / parimutuel odds
- Stock prices
- Futures contracts
- Voting
- Computer algorithms, interfaces

2010 Haitian Earthquake

Disaster Response

The maps are bad

Ushahidi

Robert Munro

Disaster Response

Better maps from Crowdsourcing

Ushahidi

Robert Munro

Disaster Response

The responders don’t speak Kreyol

- Fanmi mwen nan Kafou, 24 Cote Plage, 41A bezwen manje ak dlo
- Moun kwense nan Sakre Kè nan Pòtoprens
- Ti ekipman Lopital General genyen yo paka minm fè 24 è
- Fanm gen tranche pou fè yon pitit nan Delmas 31

- My family in Carrefour, 24 Cote Plage,41A needs food and water
- People trapped in Sacred Heart Church, PauP
- General Hospital has less than 24 hrs. supplies
- Undergoing children delivery Delmas 31

Ushahidi

Robert Munro

Disaster Response

Maps + Translation + Local Knowledge

Workers collaborated to find locations:

Dalila: I need Thomassin Apo please
Apo: Kenscoff Route: Lat: 18.495746829274168, Long:-72.31849193572998
Apo: This Area after Petion-Ville and Pelerin 5 is not on Google Map. We have no streets name
Apo: I know this place like my pocket
Dalila: thank God u was here

Feedback from responders:

"just got emergency SMS, child delivery, USCG are acting, and, the GPS coordinates of the location we got from someone of your team were 100% accurate!"

Robert Munro

Disaster Response

- Clark Craig of the Marine Corps:
  - "I cannot overemphasize to you what the work of the Ushahidi/Haiti has provided. It is saving lives every day."
- Secretary of State Hillary Clinton:
  - "The technology community has set up interactive maps to help us identify needs and target resources. And on Monday, a seven-year-old girl and two women were pulled from the rubble of a collapsed supermarket by an American search-and-rescue team after they sent a text message calling for help."
- Craig Fulgate, FEMA Task Force:
  - "[The] Crisis Map of Haiti represents the most comprehensive and up-to-date map available to the humanitarian community."
- Ushahidi@Tufts :
  - "The World Food Program delivered food to an informal camp of 2500 people, having yet to receive food or water, in Diquini to a location that 4636 had identified for them."

How can computer science and economics help facilitate collective intelligence?

NASA Clickworkers (2000)

NASA showed that public volunteers could do routine science analysis that would normally be done by a graduate student working for months on end. From 11/2000 to 1/2002, they had **101,000 clickworkers** volunteering **14,000 work hours**, **612,832 sessions**, and **2,378,820 entries**!

We try to have several people cover each region on Mars so that we can compute a consensus, throwing out any mistaken or frivilous entries and averaging out the inaccuracies.

Here are all the clicks we received for this region

Here is the consensus

NASA Clickworkers (2000)

Mars age map produced directly from clickworker inputs.

Mars age map produced from scientists

Color guide: red=heavily cratered (old), green=medium, violet=lightly cratered (young).

Mechanical Turk is a marketplace for work.

We give businesses and developers access to an on-demand, scalable workforce.
Workers select from thousands of tasks and work whenever it's convenient.

37,649 HITs available. View them now.

Make Money
by working on HITs

HITs - *Human Intelligence Tasks* - are individual tasks that you work on. Find HITs now.

As a Mechanical Turk Worker you:

- Can work from home
- Choose your own work hours
- Get paid for doing good work

Find HITs Now

or learn more about being a **Worker**

Get Results
from Mechanical Turk Workers

Ask workers to complete HITs - *Human Intelligence Tasks* - and get results using Mechanical Turk. Register Now

As a Mechanical Turk Requester you:

- Have access to a global, on-demand, 24 x 7 workforce
- Get thousands of HITs completed in minutes
- Pay only when you're satisfied with the results

Get Started

or learn more about being a **Requester**

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amazonmechanical turk
Artificial Artificial Intelligence

Your Account | HITs | Qualifications

37,530 HITs available now

Sign In

All HITs | HITs Available To You | HITs Assigned To You

Search for HITs containing that pay at least $ 0.00 for which you are qu

Timer: 00:00:00 of 5 minutes

Want to work on this HIT? Accept HIT

Want to see other HITs? Skip HIT

Total Earned: Unavailal

Total HITs Submitted: 0

Enter Postmark & Stamp Information for a Postcard

Requester: Cardcow **Reward:** $0.01 per HIT **HITs Available:** 2 **Duration:** 5 minutes

Qualifications Required: Data Entry for Postcards has been granted

Enter Postmark & Stamp Information for this card

Postmark City:

Postmark State: (or Country)

Postmark Date: (Ex: Nov-09) (month & day)

Postmark Year: (Ex: 1909)

Stamp: (Ex: 1c, 2c, half penny)

amazonmechanical turk
Artificial Artificial Intelligence

Your Account | HITs | Qualifications | 37,530 HITs available now | Sign In

All HITs | HITs Available To You | HITs Assigned To You

Search for HITs containing that pay at least $ 0.00 for which you are qu

Timer: 00:00:00 of 5 minutes Want to work on this HIT? Accept HIT Want to see other HITs? Skip HIT Total Earned: Unavailal Total HITs Submitted: 0

Enter Postmark & Stamp Information for a Postcard

Requester: Cardcow Reward: $0.01 per HIT HITs Available: 2 Duration: 5 minutes

s been granted

Postmark City: Barre

Postmark State: MA

Postmark Date: Oct-11

Postmark Year: 1886

Stamp: 1c

$ 0.01

Postmark City: Postmark State: (or Country) Postmark D (Ex: Nov-09 (month & day) : 1c, 2c,

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Get Started

or learn more about being a **Requester**

Business Cards *Solved*

step 1
point & capture

step 2
real people

step 3
contact done

GET STARTED

Simple

Accurate

Reliable

CastingWords

STEP 1 OF 3

CHOOSE A PRODUCT BELO

TRANSCRIPTION MADE FAST AND EASY.

3 easy steps

UPFRONT PRICING, NO ACCOUNT NEEDED

CASTINGWORDS TRANSCRIPTION SERVICES:

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CastingWords' Budget, Express and Expedited products are transcribed, edited, and reviewed multiple times, by people, never machines.

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You always know what is happening with your audio transcription order.

We were constantly surprised that phrases or names that other companies missed, from *"tabula rasa"* to *"turducken"* (it's a Cajun specialty), were identified and spelled correctly.

WALL STREET JOURNAL

NEWS & UPDATES

AUGUST 12 2013: Google Checkout is closing, and we're going to remove it as a payment

Help African Refugees

Choose the right word

Dolores Labs

THE SHEEP MARKET

10,000 sheep created by online workers.
More...

Catch some zzzzs

2202/10000

thesheepmarket.com

Improve your sex life

Fleshmap

Dark Side of Crowdsourcing

(J Zittrain, “Minds for Sale”)

- Surveillance
- Alienation and Deskilling
- Moral Valence
- Race to the Bottom

Iranian protesters appearing in widely disseminated online photos from the ongoing post-election demonstrations in Iran, are now being targeted on a website of the Islamic Revolutionary Guard Corps.

The website, called ‘vortex'... shows images of 20 people with red circles drawn around their faces claiming without evidence that they have been involved in creating “chaos” in Tehran.

Citizens are invited to call or email if they can identify the people on the photos. Gerdab also claims that two of the people depicted have already been arrested. The site provides no further information about any of the depicted people.

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Actual Sighting Videos - BorderWatch℠ Archives

SEE MORE

Access to Texas Denied

Drugs Seized

Access to Texas Denied

Access to Texas Denied

Virtual Stake Outs - Live Border Cameras

Camera 1
This is a known drug traffic area. If you see people crossing from the left to right over these tracks please report this activity.

Camera 2
This area is known of illegal drug activity. If you see people moving in this area please report activity.

Camera 3
This area is a high crime area. If you see suspicious activity in this area please report. When focused on the river, please report subjects crossing via raft or swimming. If focused on land, look for subjects on foot moving towards right and may approach a vehicle parked along this area please report it immediately.

Camera 4
If you see people along river and or subjects in the water please report this

TEXAS BORDER SHERIFF'S COALITION

Create An Account

Register for your FREE Account CLICK HERE

Virtual Texas Deputy℠ Log In

Email Address:

Need an Account? LOG IN

What We Do

The Texas Border Sheriff's Coalition (TBSC) has joined BlueServo℠ in a public-private partnership to deploy the Virtual Community Watch, an innovative real-time surveillance program designed to empower the public to proactively participate in fighting border crime. The TBSC BlueServo℠ Virtual Community Watch℠ is a network of cameras and sensors along the Texas-Mexico border that feeds live streaming video to www.BlueServo.net. Users will log in to the BlueServo℠ website and directly monitor suspicious criminal activity along the

Reddit manhunt falsely accuses wrong person

- After the Boston Marathon bombing Redditors tried and failed to find the bombers by pouring over photographs
- Sunil Tripathi, a Brown U student who had gone missing was falsely accused
- Why did they fail so badly?

How to put crowdsourcing towards good uses

Use of MTurk-like systems in research

- Participant pool for user studies, polling cognitive science experiments
- Annotation for machine learning tasks like computer vision or NLP
- Human Computer Interaction: worker pools are hardwired into the UI
- New Programming Languages Concepts
- Study markets themselves for economics research, cost-optimization

Crowdsourcing and the Social Sciences

Social Psychology

From **Buhrmester, Kwang, & Gosling (2011, Perspectives on Psychological Science) Amazon's Mechanical Turk: A New Source of Inexpensive, Yet High-Quality, Data?** :

Findings indicate that: (a) MTurk participants are slightly more representative of the U.S. population than are standard Internet samples and are significantly more diverse than typical American college samples; (b) participation is affected by compensation rate and task length but participants can still be recruited rapidly and inexpensively; (c) realistic compensation rates do not affect data quality; and (d) the data obtained are at least as reliable as those obtained via traditional methods.

Economics

From Horton, Rand & Zeckhauser (2010, Experimental Economics) – The Online Laboratory: Conducting Experiments in a Real Labor Market :

Online experiments can be just as valid as laboratory and field experiments, while requiring far less money and time to design and to conduct. We describe the benefits of conducting experiments in onlin labor markets and we replicate three classic experiments.

Clinical Psychology **Management/Cognition** **Theoretical Biology**

Examples from Gilad Fili Feldman's blog: http://mgto.org/

Crowdsourcing and the Social Sciences

ViewSer: Enabling Eye Tracking[lite] at Scale (Agichtein SIGIR 2011, CHI 2011)

User studies / polling

World wide workforce

Annotation for machine learning tasks

HD
N
rS
lS
rE
lE
person-skeleto
rW
rH
lH
lW
lKn
rKn
lA
rA

Human Computer Interaction

- VizWiz - best paper award at UIST 2010
  - Mobile service that aids bind uses with “visual questions” in near-realtime
  - http://www.cs.rochester.edu/u/jbigham/vizwiz/video/

"Double-tap to take a photo."
"Double-tap to begin recording your question and again to stop."
"The first answer is 'The right side,' the second answer is …"
Recording...
Use the microphone button to record a question.
the corn is on the right
The can all the way to the right.
The right side.
User
"Which can is the corn?"
Local Client
Remote Services and Worker Interface
Database -
Web Server -
Speech Recognition -
Server
quikTurkit
Which can is the corn??
Answer the question:
Submit Answer
Unable to answer the question?

Human Computer Interaction

- Soylent - a Word Processor that is made of people http://projects.csail.mit.edu/soylent/
- Uses workers on MTurk to perform several tasks
    - Shortn: reduce the length of a paragraph
    - Crowdproof: proofread and correct errors
    - The human macro: A natural language interface to making changes to a document

New Programming Languages Concepts

New Programming Languages Concepts

```
ideas = []
for (var i = 0; i < 5; i++) {
    idea = mturk.prompt(
        "What’s fun to see in New York City?
         Ideas so far: " + ideas.join(", "))
    ideas.push(idea)
}

ideas.sort(function (a, b) {
    v = mturk.vote("Which is better?", [a, b])
    return v == a ? -1 : 1
})
```

New Programming Languages Concepts

- Latency
- Cost
- Parallelization
- Non-determinism
- Iterative improvement

- Please transcribe as many words as you can.
- Put a * in front of words you are unsure about.

Submit

Iteration 4: TV is* *festival ____ was *two *me ____ , *but ____ *is ____ ____ TV ____ . I *two ____ tv ____ ____ ____ *festival , ____ I ____ ____ is* ____ it ____ *festival .

Iteration 6: TV is supposed to be bad for you , but I ____ watching some TV *shows . I think some TV shows are *really *advertising , and I ____ ____ is good for the ____

Iteration 12: TV is supposed to be bad for you , but I am watching some TV shows . I think some TV shows are really entertaining , and I think it is good to be entertained .

Study Markets Themselves

- What predictions of economics hold true on MTurk?
- What incentives can we give to increase throughput, quality, worker retention?
- What is the cost-optimal solution to a problem?

What will we cover in this class (and should you take it)?

Syllabus

- Taxonomy of crowdsourcing and human computation
- The Mechanical Turk crowdsourcing platform
- Programming concepts for human computation
- The economics of crowdsourcing
- Crowdsourcing and machine learning
- Applications to human computer interaction
- Crowdsourcing and social science
- Collective intelligence

Who should take this class

- Anyone who wants to be on the cutting edge of this new field
- Entrepreneurial students who want to start their own companies
- Students from the business school who want to experiment with markets
- Students from the social sciences who want to conduct large-scale students with people

Course Requirements

Weekly assignments	Writing and Coding
In class presentations	Company profile, project pitch
Final project	Self-designed
Final presentation	Show off your work

How much programming is required?

- Programming assignments are in Python
- We provide code that you modify
- We want everyone to be able to participate, regardless of programming experience
- You can work with a partner (turn in only one assignment - you'll both get the same grade)

Programming assignments: Twitter sentiment analyzer

- The programming assignments form a sequence
  - Harvest Tweets that mention a company or multiple companies
  - Design a MTurk HIT to have Turkers categorize the sentiment (neutral/+/-)
  - Automatically grade the Turkers and analyze their quality / trustworthiness
  - Train a machine learning classifier based on the data that you collected

Written assignments

- Become a Turker and analyze your experience
- Write a company profile for a company that uses crowdsourcing
- Write a synthesis of 3 academic papers
- Cost analysis of your Twitter sentiment classifier

Reading assignments

We will be using The Wisdom of Crowds as the course reader, and supplementing it with optional readings from academic papers.

You will have to write a synthesis of 3 academic papers.

SUBMIT YOUR DESIGN

Your design is ready. Now all you have to do is pick a design challenge to submit to. The Threadless challenge is our big, ongoing, challenge. All the rest have themes, timelines, and different stuff up for grabs.

Threadless
Submit a design

Teachers
Submit for 19 more days

JUST ANOTHER BRICK IN THE WALL

Design by Monkey X

396 designs left to score View all

Enter to win this design if it gets printed!

Scoring open for 7 days.

Filters

All Challenge Sources

- [ ] Premium
- [ ] Grand Challenge

All Challenge Disciplines

- [ ] Business & Entrepreneurship
- [ ] Chemistry
- [ ] Computer/Info. Technology
- [ ] Engineering/Design
- [ ] Food/Agriculture
- [ ] Life Sciences
- [ ] Math/Statistics
- [ ] Physical Sciences
- [ ] Requests for Partners

All Pavilions

- [ ] AARP Foundation | visit »
- [ ] Cleveland Clinic | visit »
- [ ] Lumina | visit »
- [ ] NASA | visit »
- [ ] Nature | visit »
- [ ] Scientific American | visit »
- [ ] Tec^Edge (Air Force) | visit »
- [ ] The Economist | visit »
- [ ] UnitedHealth Group | visit »
- [ ] Clean Tech | visit »
- [ ] Developing Countries | visit »
- [ ] Emergency Response | visit »
- [ ] Environment | visit »
- [ ] Global Health | visit »

InnoCentive Challenges

Save Settings

Show: 50 | 1 2 3 4 5 .. 13 Next »

You Are Viewing: All

Show Challenge Types: [x] All [ ] Ideation [ ] Theoretical [ ] RTP [ ] eRFP

+	Title	Posted	Deadline	Award	Solvers
	Enabling Local Government to Communicate Compelling Messages TAGS: Business/Entrepreneurship, Computer Science/Information Technology, Food/Agriculture, Math/Statistics, Requests for Partners and Suppliers, Ideation + View More PREMIUM CHALLENGE	8/22/13	9/22/13	$7,500 USD	76
	General Method for Determining Interactions between Molecules in a Crystal Lattice TAGS: Chemistry, Computer Science/Information Technology, Physical Sciences, Theoretical-IP Transfer + View More PREMIUM CHALLENGE	8/22/13	10/19/13	$15,000 USD	45
	Supporting the EU App Economy – Addressing EU Market Conditions TAGS: Business/Entrepreneurship, Computer Science/Information Technology, Engineering/Design,	8/22/13	9/27/13	$5,000 USD	29

Team Share

Other Companies

- Platform providers: Amazon Mechanical Turk, oDesk, Crowdflower
- Creativity: Threadless, iStockPhoto, 99Designs, Kickstarter, quirky
- Reviews: Yelp, RottenTomatoes, Netflix, Amazon
- Politics / finance: in-trade, Ushahiti, Kiva

What will you get out of this class?

- Understanding of an emerging field of CS
- Basic python and machine learning skills
- Ideas that you could transform into a startup company or academic research
- A new way of thinking about collective decision making companies and countries
- Summer internships?

Who are we?

Chris Callison-Burch

- New Professor in CIS
- UGrad from Stanford in Symbolic Systems
- PhD from U Edinburgh in Informatics
- Research Faculty at Johns Hopkins University
- Research Interests: Crowdsourcing, Natural Language Processing
- Office: Levine 506, Email: ccb@cis.upenn.edu
  Twitter: @ccb

Leaderboard

Mechanical Turk Monitor: Top-1000 Recent Requesters

General | Top requesters | Arrivals | Completed | Search | About

	Requester ID	Requester	#Task	#HITs	Rewards
1	Dolores Labs	A2IR7ETVOIULZU (RSS)	470	317857	33084.24
2	ContentGalore	A2XL3J4NH6JI12 (RSS)	674	10622	17554.6
3	SpeechInk	A1AQ7EJ5P7ME65 (RSS)	9019	13613	12876.67
4	CastingWords	A3MI6MIUNWCR7F (RSS)	9454	14036	8947.02
5	QuestionSwami	AD7C0BZNKYGYV (RSS)	629	4116	4750.37
6	Chris Callison-Burch	A32TTE4XXN6MQZ (RSS)	11	9961	4458.02
7	Smartsheet.com Clients	A1197OGL0WOQ3G (RSS)	434	38212	3118.28
8	retaildata	AD14NALRDOSN9 (RSS)	8	50288	3110.85
9	Classify This	A1CTI3ZAWTR5AZ (RSS)	25	94590	1891.8
10	Andrew Stephen	A1Y25F6MZCMQGY (RSS)	3	22705	1131.25
11	Dolores Labs 2	A3JX8WONBL5N9X (RSS)	34	8976	1043.27
12	RelevanceQuest	A8RMEN71ICE57 (RSS)	15	47881	1029.92
13	Crowd Task	AFAOUHS65HNDS (RSS)	4	2388	955.6
14	nlds.soe.ucsc.edu	A1HI9DWCF794RE (RSS)	4	4702	933.9

Ellie Pavlick

- 2nd Year PhD student in CIS
- Undergrad from JHU in Economics and in Music, with minor in Computer Science
- Research into crowdsourcing: ESL error correction
- email: elliepavlick@gmail.com

Homework 1: Be a Turker, Sign up as a Requester, Read “Wisdom of Crowds” Intro plus Chapter 1

Amazon Mechanical Turk

- Online marketplace for work
- Turkers = Workers
- Requesters = Employers
- HITs = Human Intelligence Tasks
- Qualification tests
- Approval / rejection / block
- Reputation system

No Class On Monday

- It’s Labor Day
- ... good time to reflect on the rights of the crowd worker!

Next week...

- Discuss your experience as a Turker
  - How much money did you make?
  - What was your hourly wage?
  - Did you find tasks that are fun?
- Lecture on Demographics of MTurk and the economics of the MTurk marketplace