Crowdsourcing Platforms

Danna Gurari
The University of Texas at Austin
Fall 2019

https://www.ischool.utexas.edu/~dannag/Courses/CrowdsourcingForCV/CourseContent.html

Review

- Last week:
  - Attribute labeling applications
  - Attributes: dataset creation approaches
  - Beyond binary classification: relative/indistinguishable pairs of attributes

- Assignments (Canvas)
  - Reading assignment 3 due yesterday
  - Reading assignment 4 due next week
  - Lab assignment 2 due in three weeks (due date changed)

- Questions?

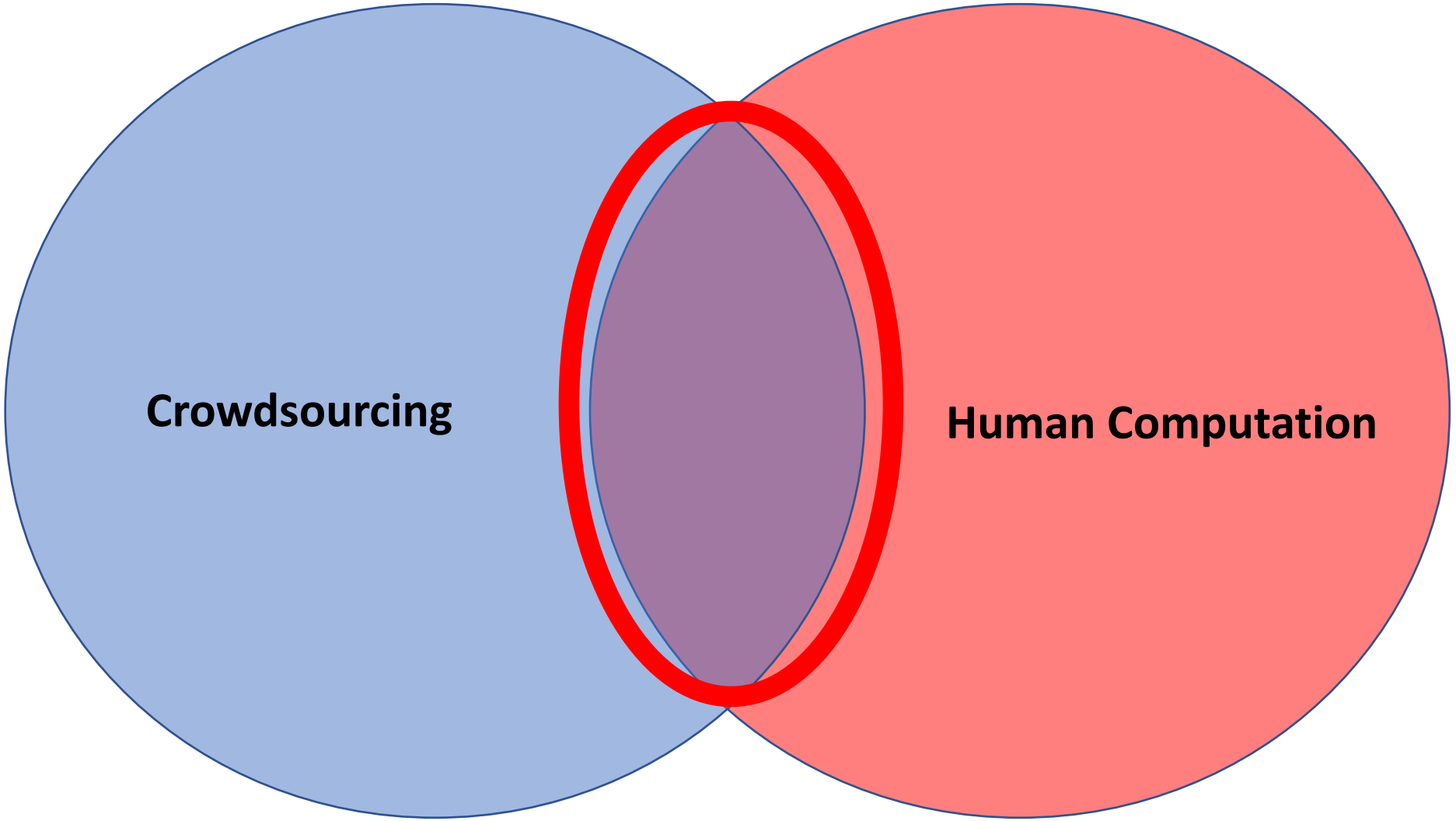
Today's Topics

- Scope of "crowdsourcing" in crowdsourcing for computer vision
- How to recruit a crowd?
- Who is the crowd?
- How to collect high quality results with a crowd?
- Lab: Alegion platform and connecting to Amazon Mechanical Turk

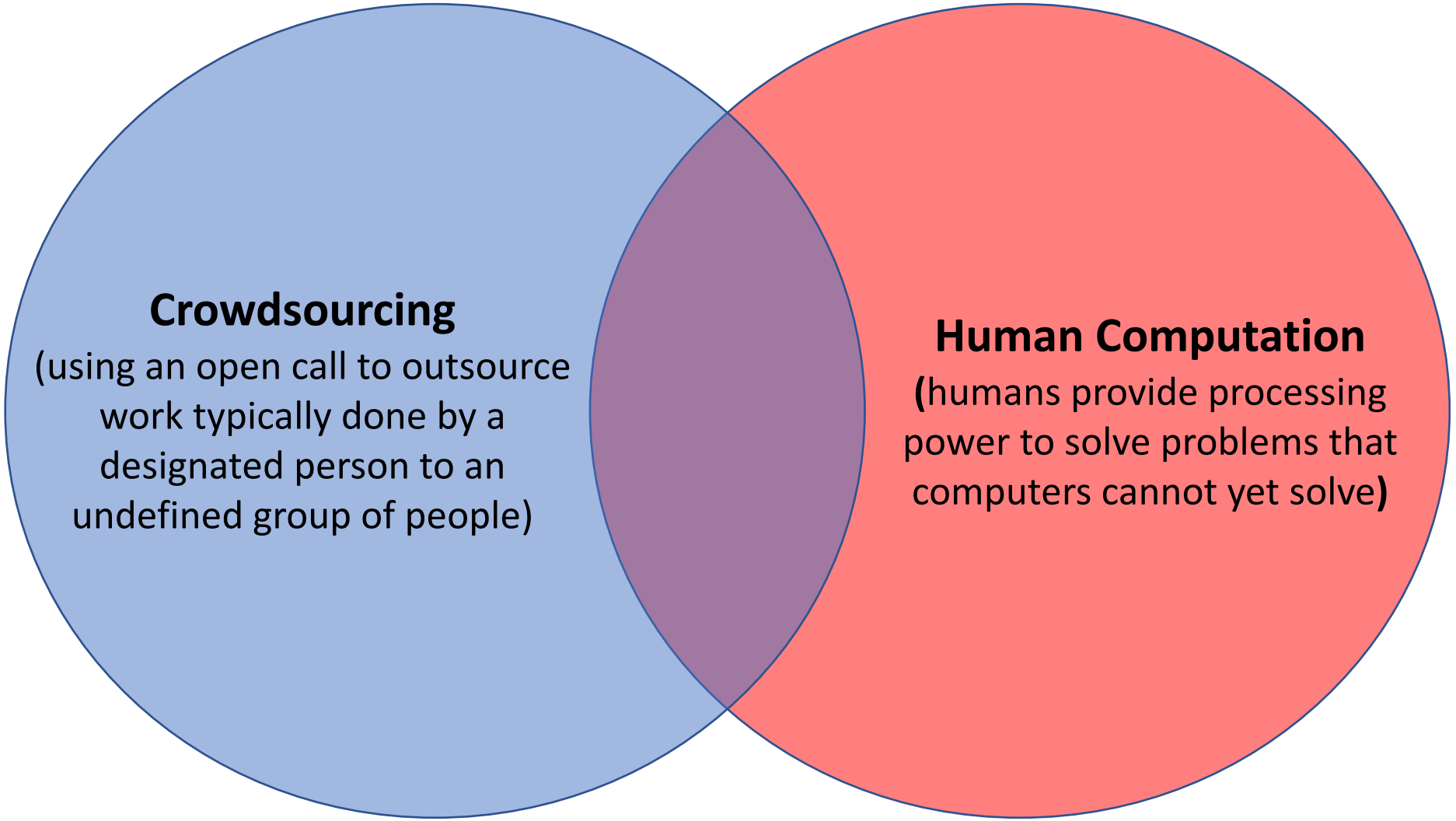
Today's Topics

- Scope of "crowdsourcing" in crowdsourcing for computer vision
- How to recruit a crowd?
- Who is the crowd?
- How to collect high quality results with a crowd?
- Lab: Alegion platform and connecting to Amazon Mechanical Turk

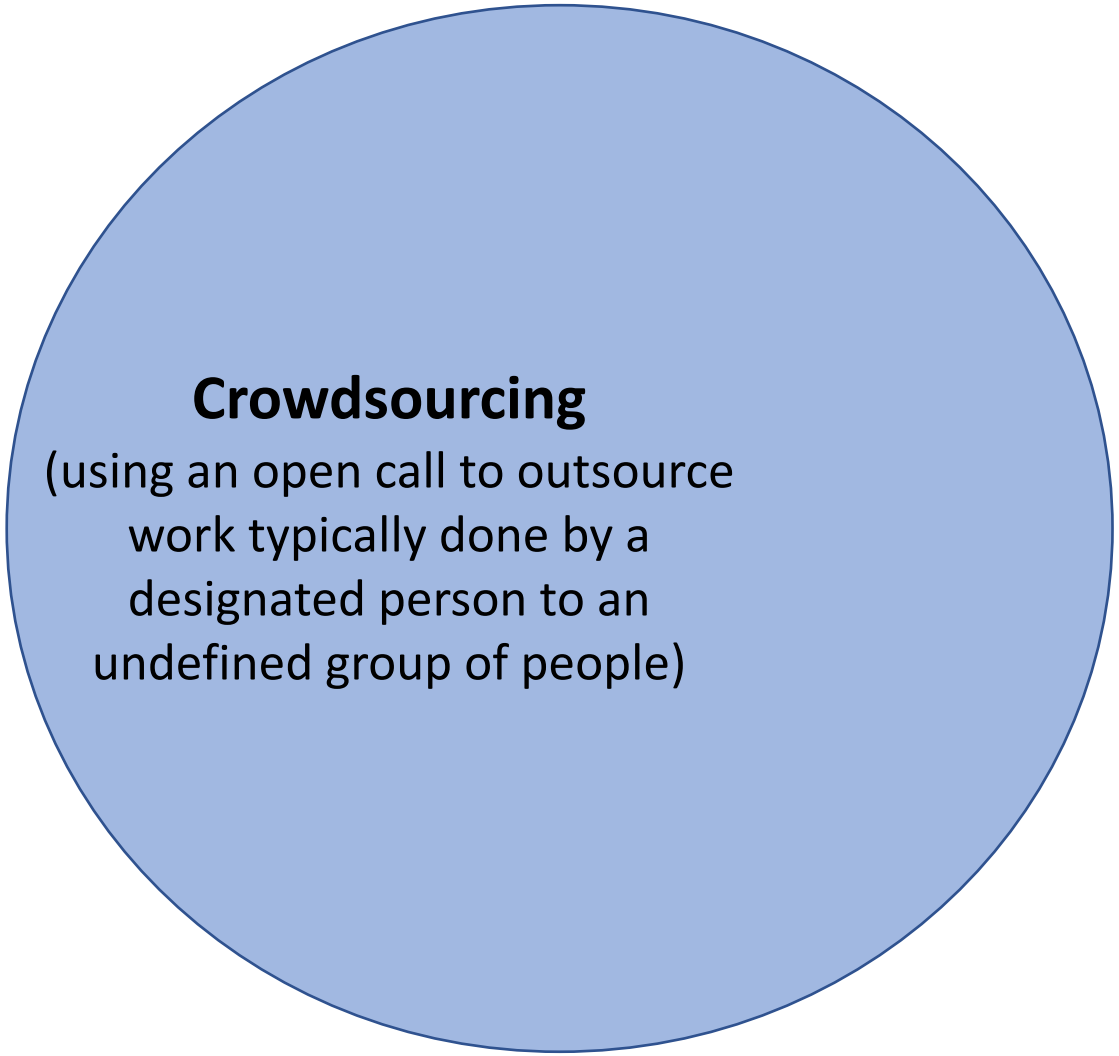
Focus of Crowdsourcing for Computer Vision



Crowdsourcing Versus Human Computation



Crowdsourcing



Crowdsourcing: Definition

Jeff Howe, 2006 Wired article:

- "outsourcing a specific set of functions of a company to an undefined set of people, instead of assigning it to designated employees"

Modified version:

- replace traditional "office" workers with "Internet" workers

Crowdsourcing: Examples

TaskRabbit

KICKSTARTER

airbnb

Rotten Tomatoes

Crowdsourcing: Examples

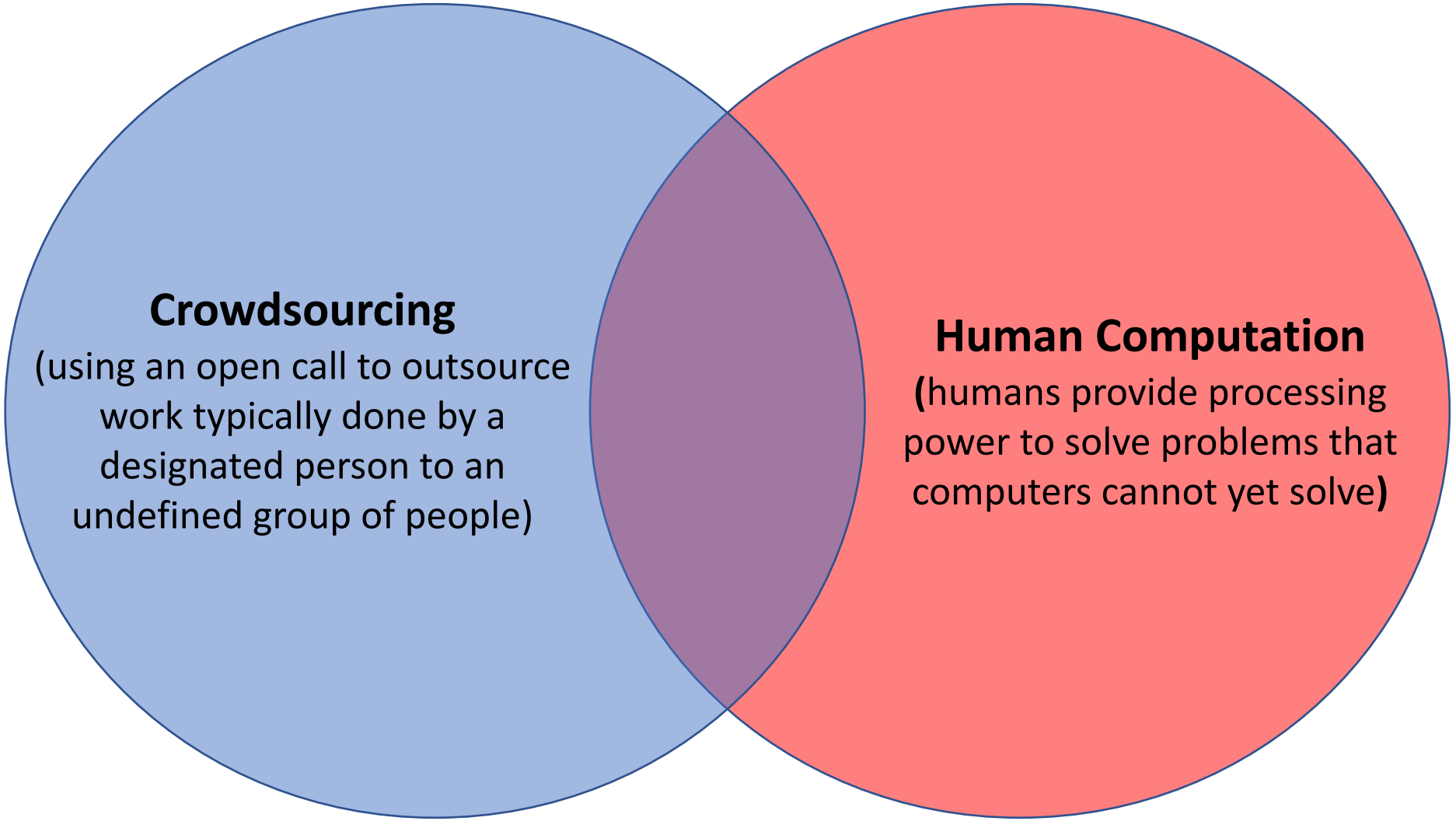
WIKIPEDIA
The Free Encyclopedia

STITCH FIX™

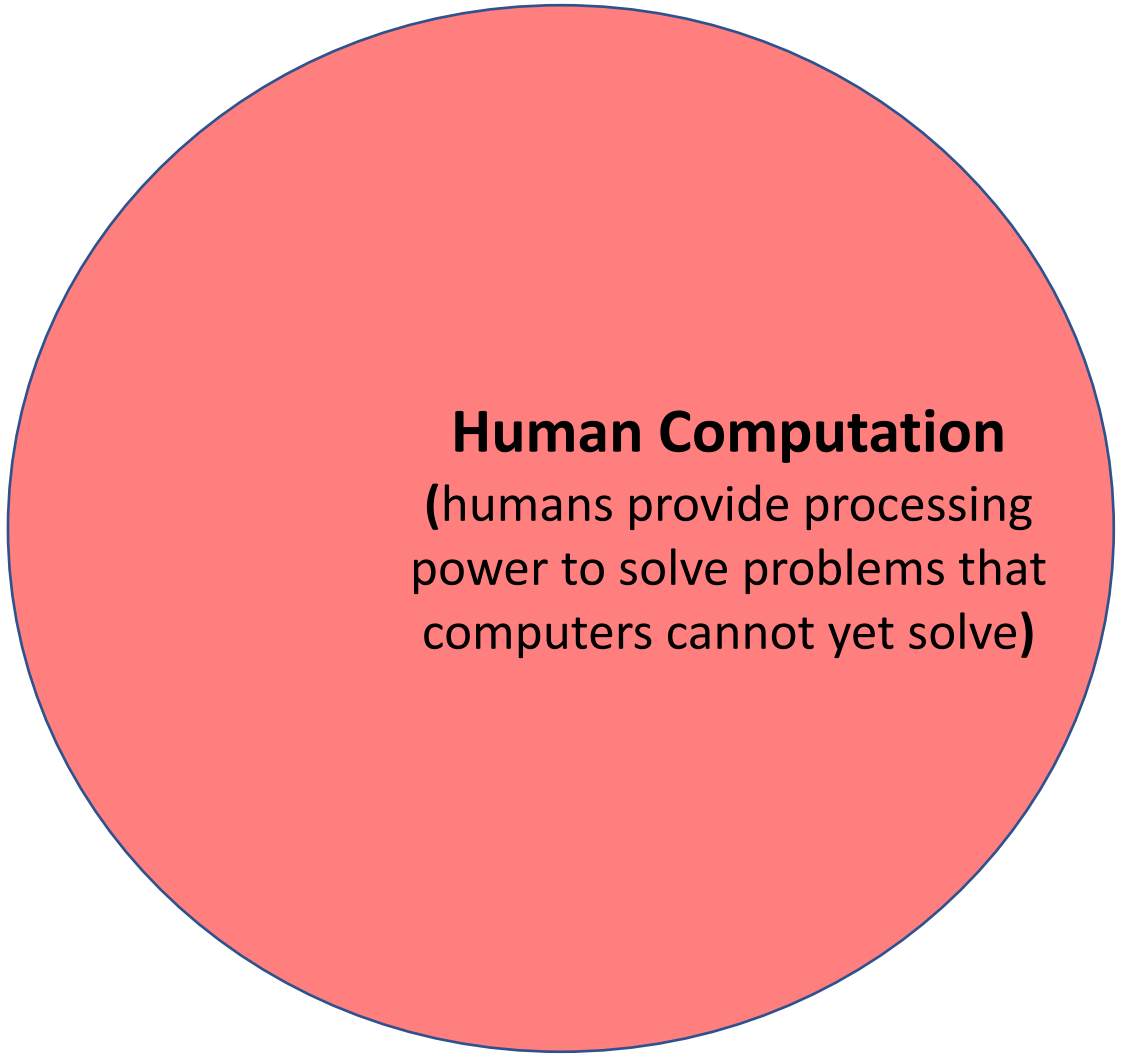
GET MORE
amazon REVIEWS
WITH
MerchBee

upwork™

Crowdsourcing Versus Human Computation



Human Computation



Human Computation: Definition

1613

Human “Computers”: first reference to people who perform calculations towards solving complex problems

- e.g., for astronomy, fluid dynamics, nuclear fission, space travel

Dorothy Vaughn

Mary Jackson

Miriam Mann

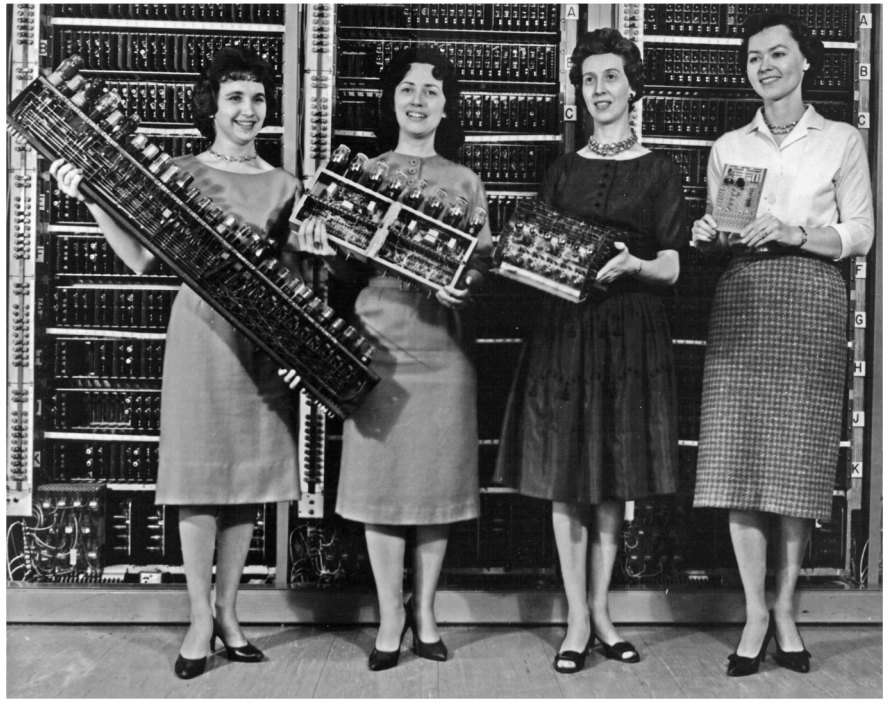
[Excellent summary: https://en.wikipedia.org/wiki/Human_computer](https://en.wikipedia.org/wiki/Human_computer)

Human Computation: Replace with Machines

1613 — Human “Computers”

1945 — First programmable machine

ENIAC (Electronic Numerical Integrator and Computer) created during World War II



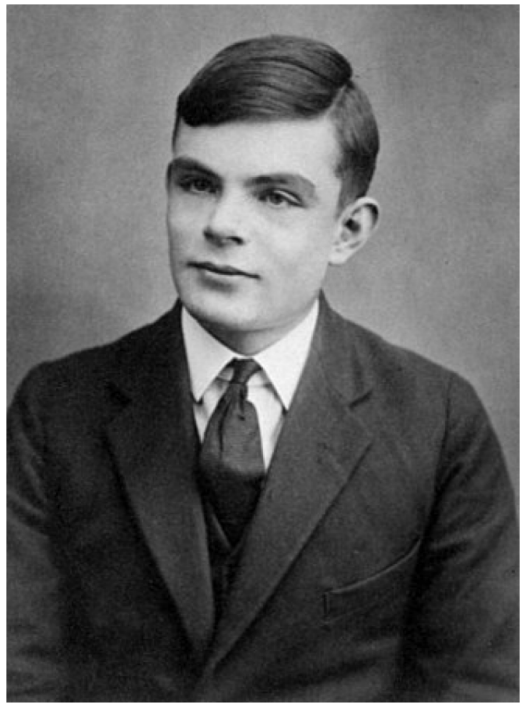
Human computers became first programmers

Human Computation: Replace with Machines

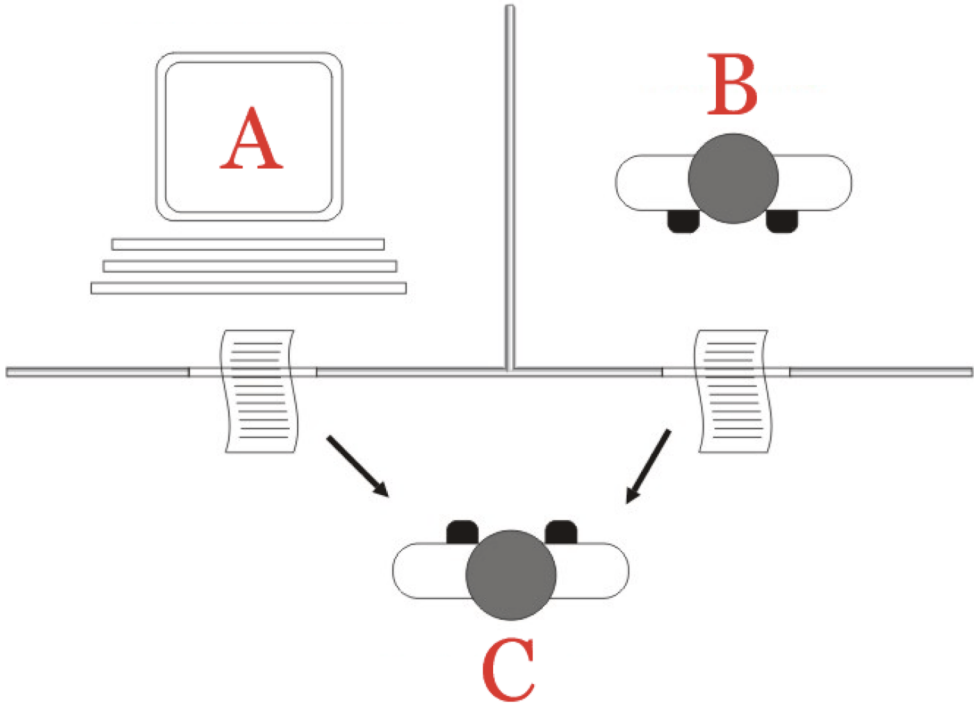
1613 — Human "Computers"

1945 — First programmable machine

1950 — Turing Test



Alan Turing
(1912-1954)



Turing Test: can "C" decide whether text responses come from a machine or human

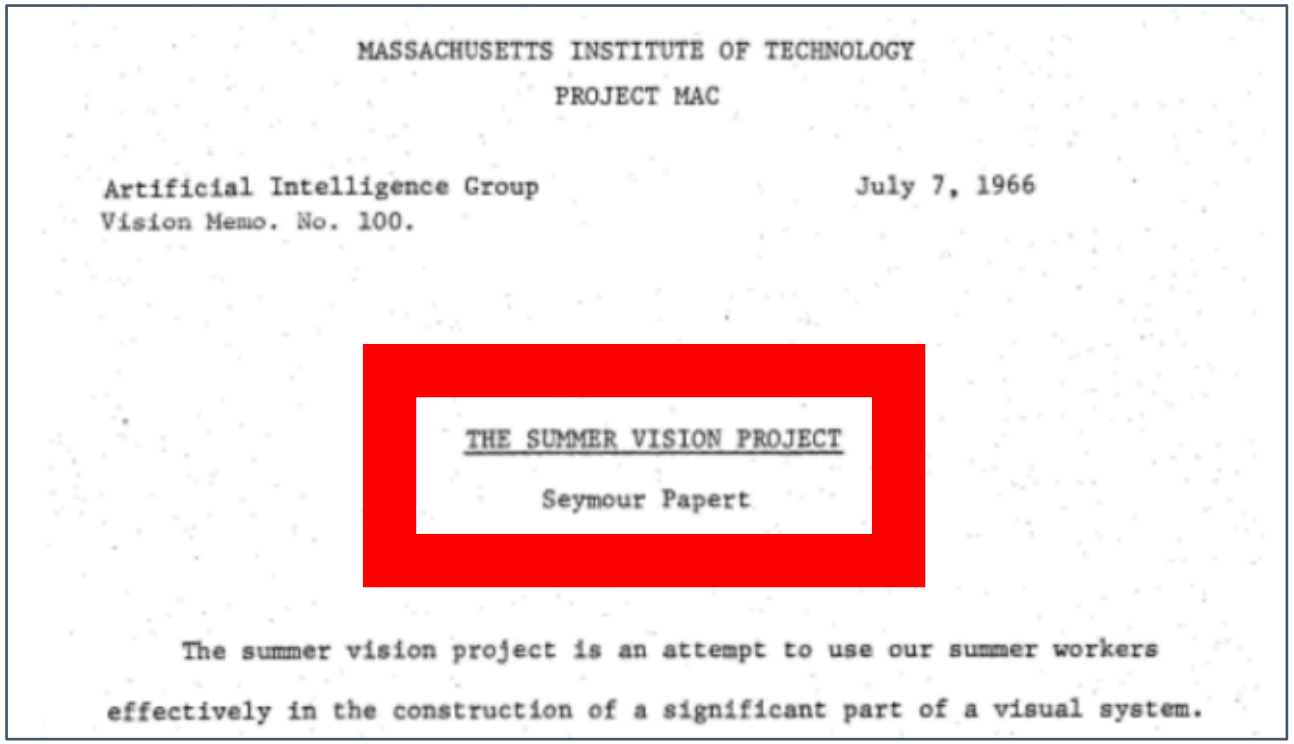
Human Computation: Replace with Machines

1613 — Human "Computers"

1945 — First programmable machine

1950 — Turing Test

1966 — Birth of Computer Vision



MASSACHUSETTS INSTITUTE OF TECHNOLOGY

PROJECT MAC

Artificial Intelligence Group — July 7, 1966

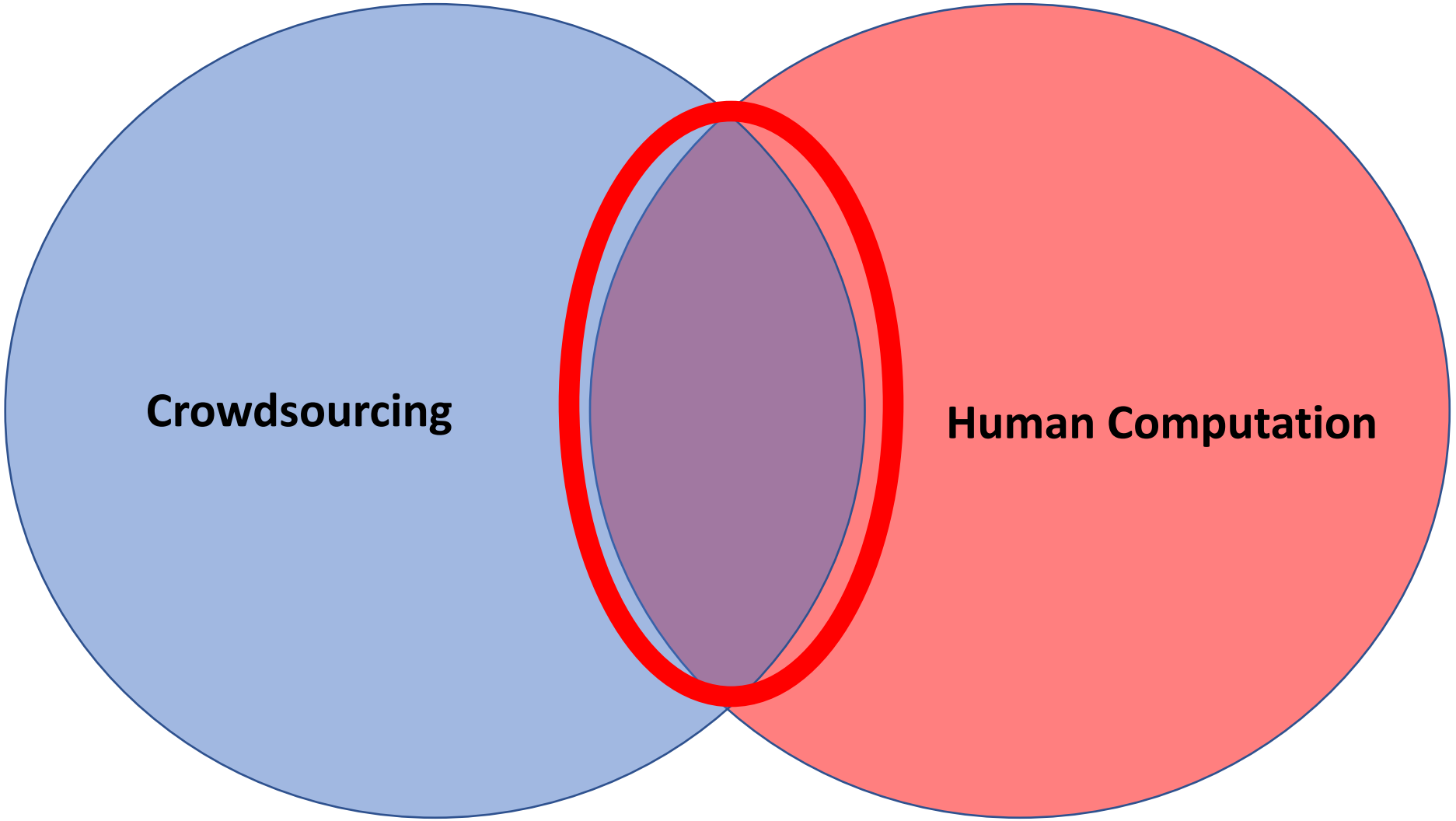
Vision Memo. No. 100.

THE SUMMER VISION PROJECT

Seymour Papert

The summer vision project is an attempt to use our summer workers effectively in the construction of a significant part of a visual system.

Our Scope: Crowdsourcing for Computer Vision



Today's Topics

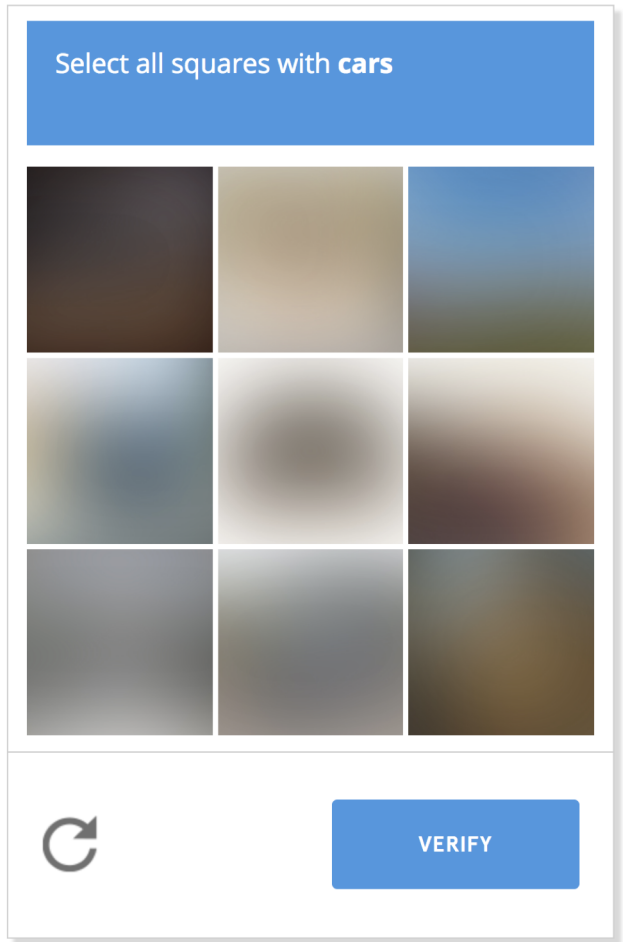
- Scope of "crowdsourcing" in crowdsourcing for computer vision
- How to recruit a crowd?
- Who is the crowd?
- How to collect high quality results with a crowd?
- Lab: Alegion platform and connecting to Amazon Mechanical Turk

How to Recruit a Crowd

- Security Questions
- Gamification
- Citizen Science
- Pay

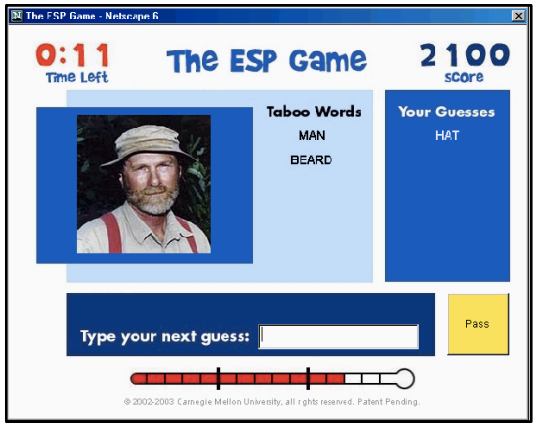
How to Recruit a Crowd

- Security Questions
- Gamification
- Citizen Science
- Pay

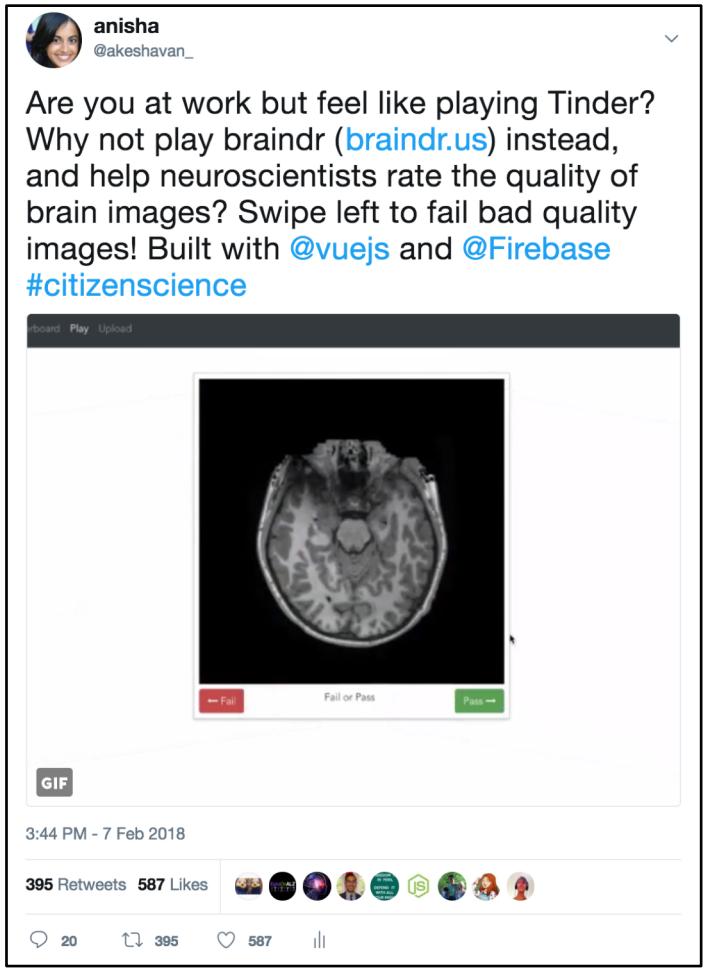


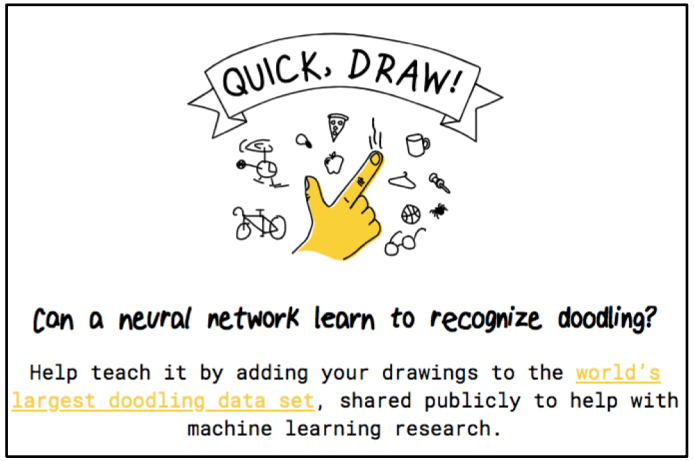
How to Recruit a Crowd

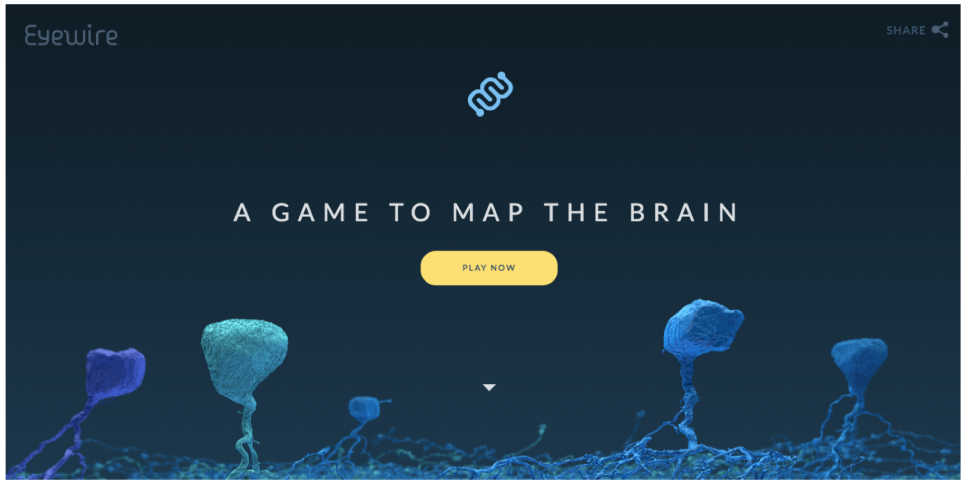
[von Ahn & Dabbish; 2004]



- Security Questions
- Gamification
- Citizen Science
- Pay







How to Recruit a Crowd

- Security Questions
- Gamification
- Citizen Science
- Pay

How to Recruit a Crowd

- Security Questions
- Gamification
- Citizen Science
- Pay

How to Recruit a Crowd

- Security Questions

When and why would you choose this approach?

- Gamification
- Citizen Science
- Pay

How to Recruit a Crowd

- Security Questions
- Gamification
- Citizen Science
- Pay

When and why would you choose this approach?

How to Recruit a Crowd

- Security Questions
- Gamification
- Citizen Science
- Pay

When and why would you choose this approach?

How to Recruit a Crowd

- Security Questions
- Gamification
- Citizen Science
- Pay

When and why would you choose this approach?

Today's Topics

- Scope of "crowdsourcing" in crowdsourcing for computer vision
- How to recruit a crowd?
- Who is the crowd?
- How to collect high quality results with a crowd?
- Lab: Alegion platform and connecting to Amazon Mechanical Turk

How to Learn About the Crowd?

- Surveys
  - e.g., request/pay workers to share their reasons
- Analyze users' comments on forums
  - Turkopticon
  - TurkerNation
  - mturk forum
  - reddit
- Ethnographic studies

Surveys on AMT

20 month study: $0.10 per HIT

Survey Date	Sample Size
Mar. 2008 [10]	*n = 300*
Nov. 2008 [11]	*n = 1010*
Feb. 2009	*n = 878*
May 2009	*n = 512*
Aug. 2009	*n = 578*
Nov. 2009	*n = 733*

[Ross et al, CHI 2010]

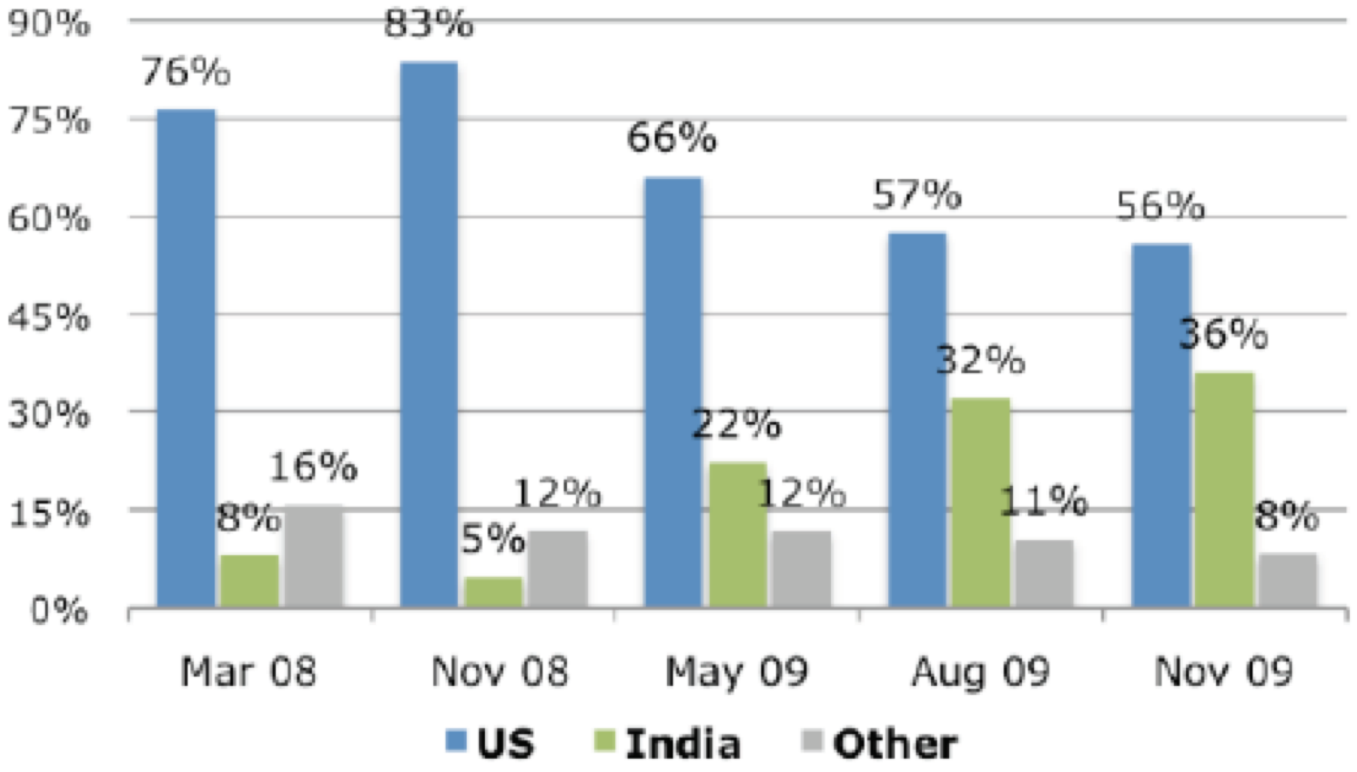
1000 AMT workers over 3 weeks in Feb. 2010; $0.10 per HIT

[Ipeirotis, 2010]

One survey posted every 15 minutes between March 2015 and July 2017 resulting in 84,511 responses from 39,461 workers; $0.05 per HIT

[Difallah, 2018]

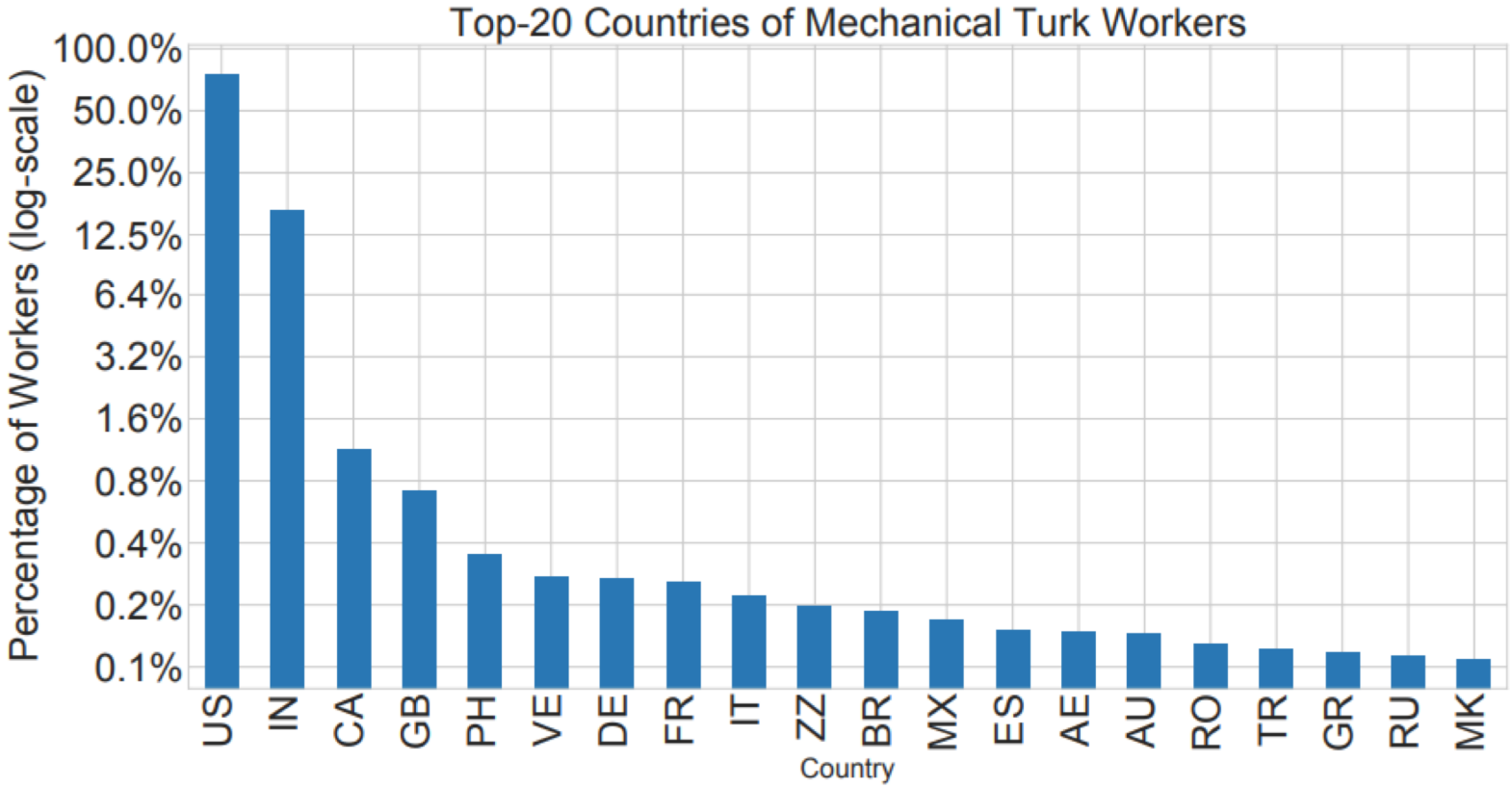
Surveys on AMT: Country of Origin



The population was predominantly from the US, but increasingly becoming international (especially from India)

Joel Ross et al. Who Are the Crowdworkers?: Shifting Demographics in Mechanical Turk. CHI 2010.

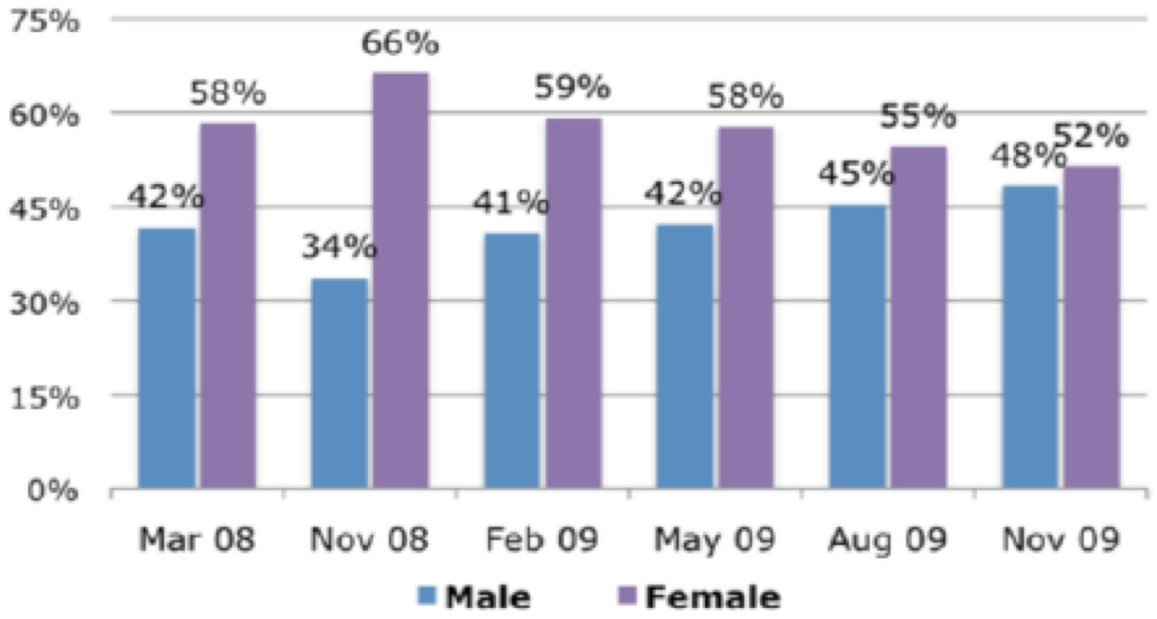
Surveys on AMT: Country of Origin



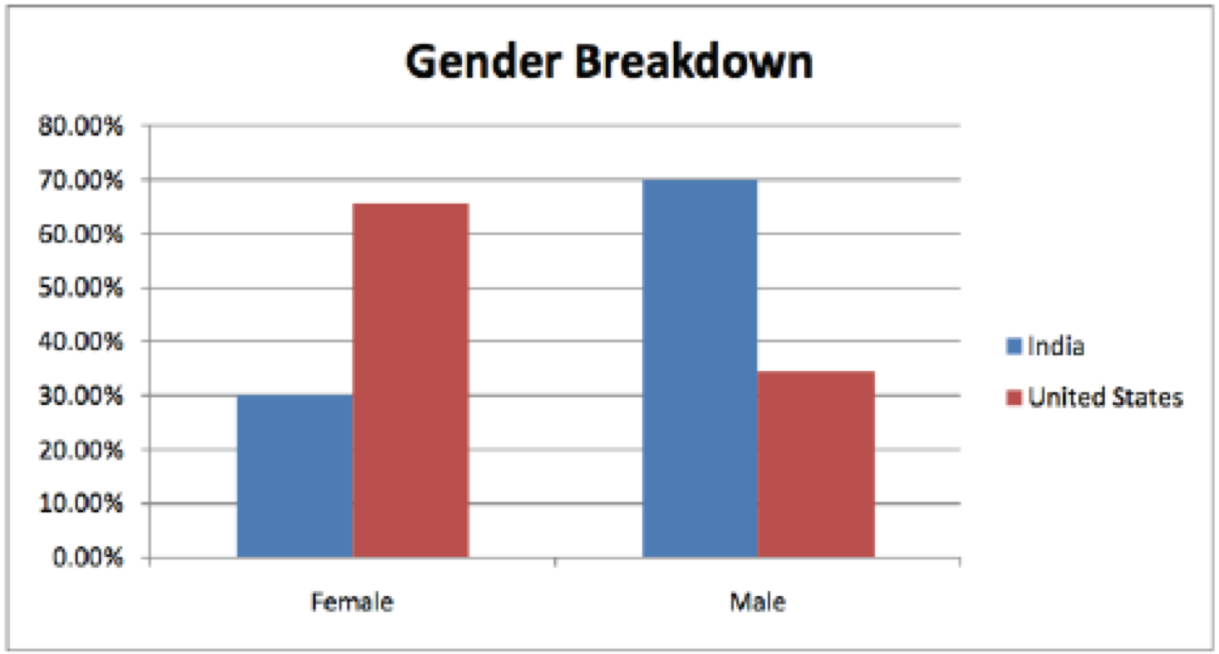
Most workers were from the USA (75%), followed by India (16%), Canada (1.1%), Great Britain (0.7%), Philippines (0.35%), and Germany (0.27%)

Djellel Difallah et al. Demographics and Dynamics of Mechanical Turk Workers. WSDM 2018.

Surveys on AMT: Self-Identified Gender



[Ross et al, CHI 2010]



[Ipeirotis, 2010]

Steady increase in % of male workers to nearly even split of genders, likely due to increase in Indian population which is largely male

Surveys on AMT: Self-Identified Gender

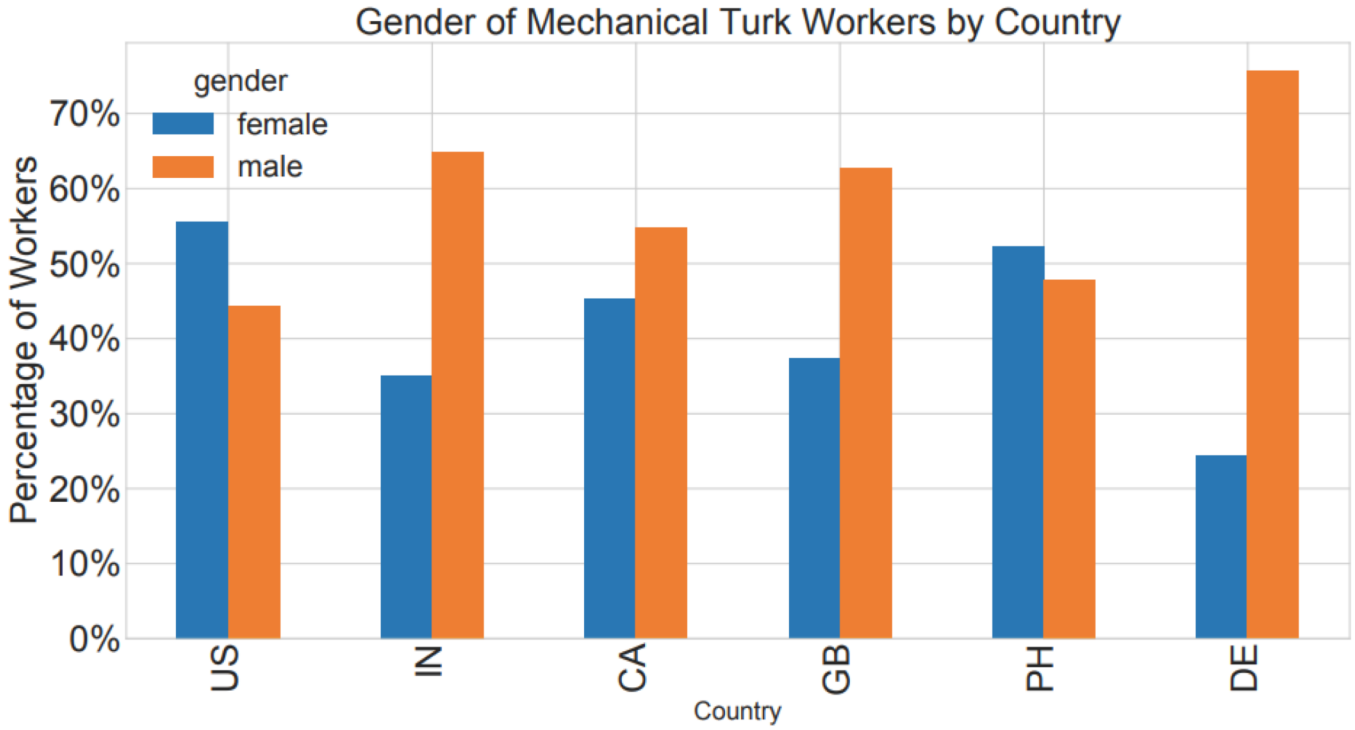
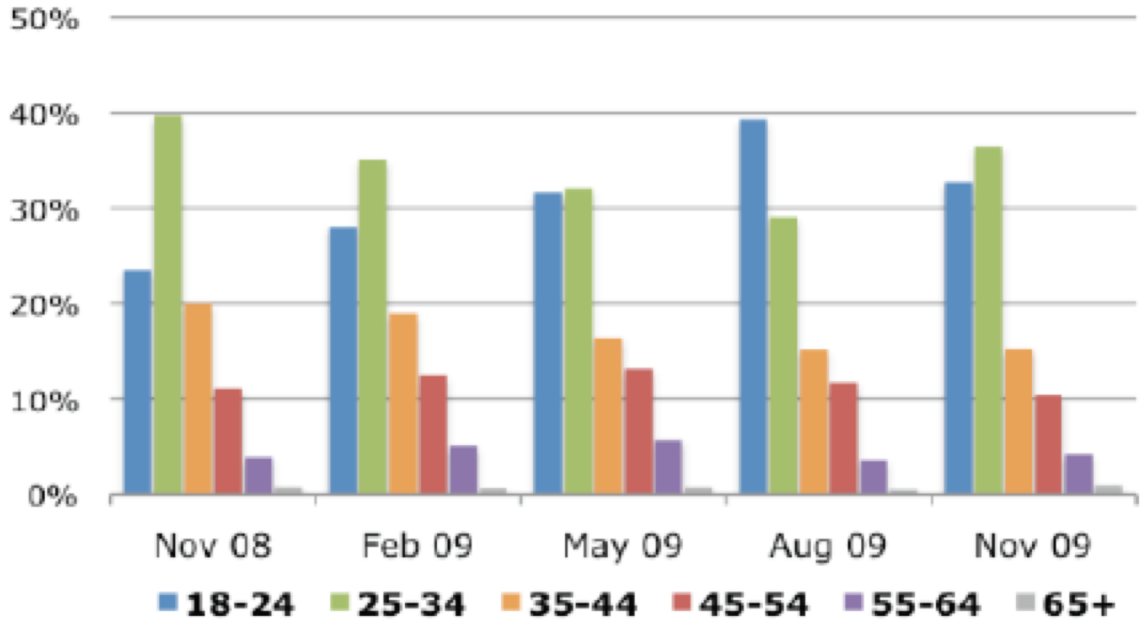


Figure 3: Gender breakdown across countries.

Gender distributions in USA and India matched earlier survey

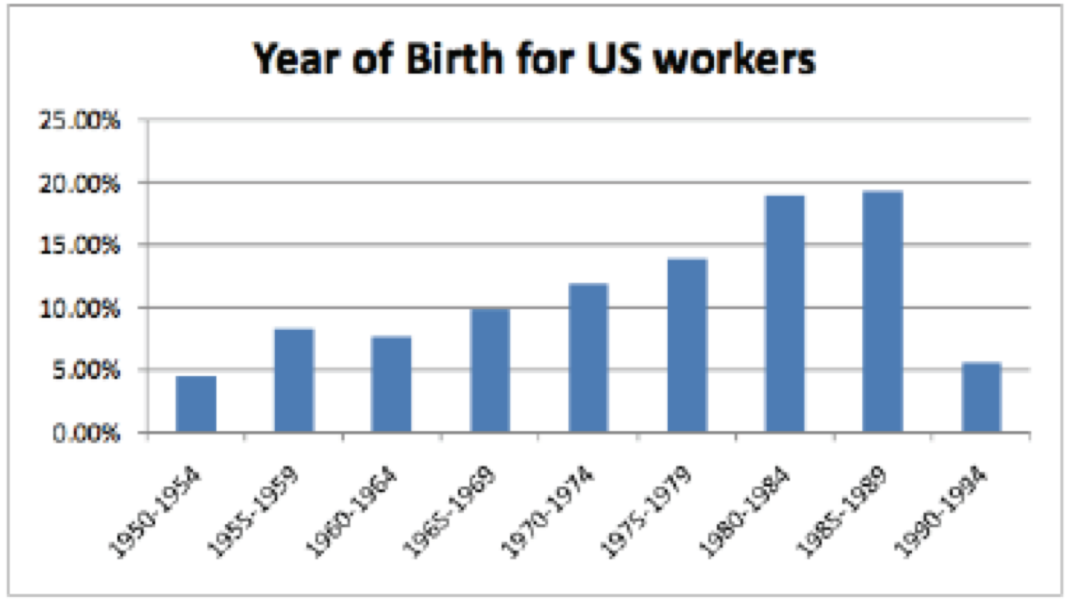
Djellel Difallah et al. Demographics and Dynamics of Mechanical Turk Workers. WSDM 2018.

Surveys on AMT: Age



[Ross et al, CHI 2010]

Steady fall in age, likely due to increase in Indian population which often includes younger workers



[Ipeirotis, 2010]

Surveys on AMT: Age

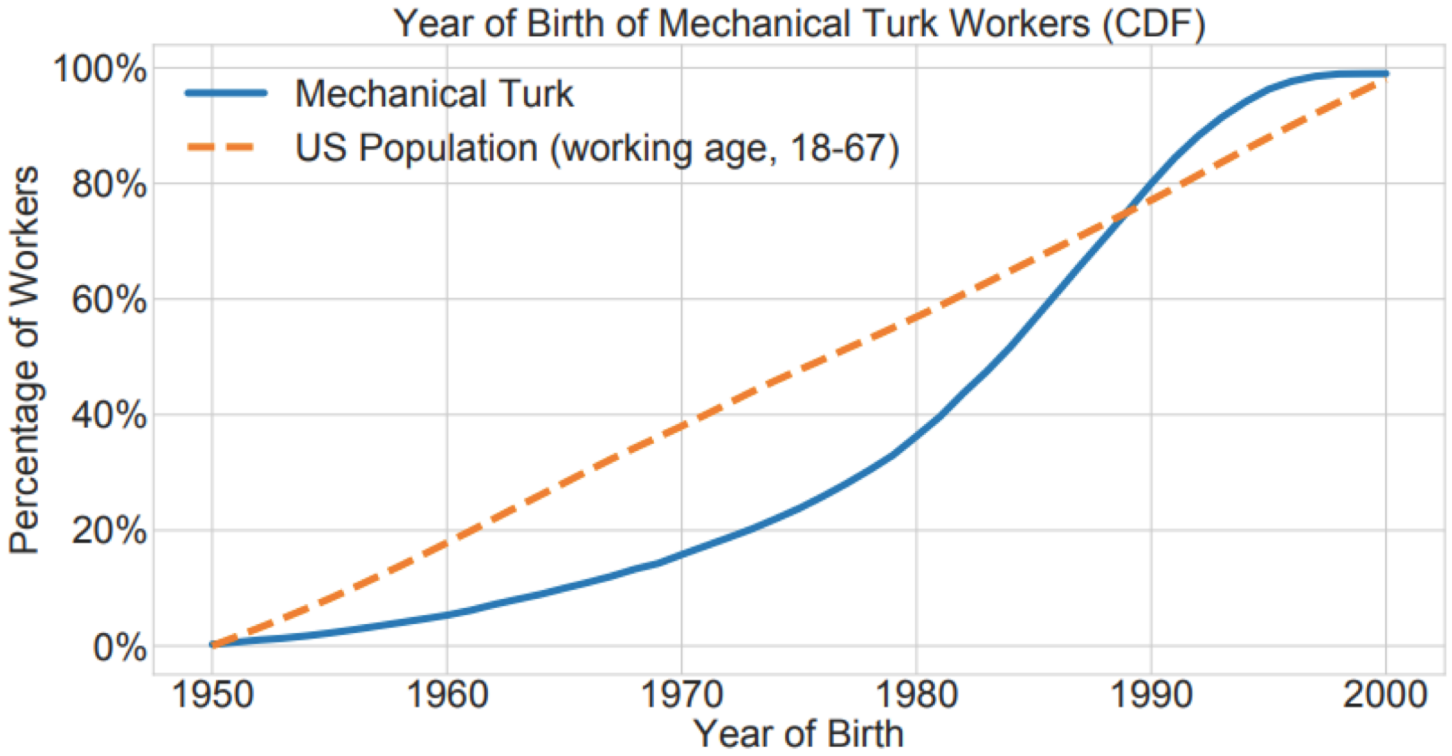


Figure 5: Year of birth.

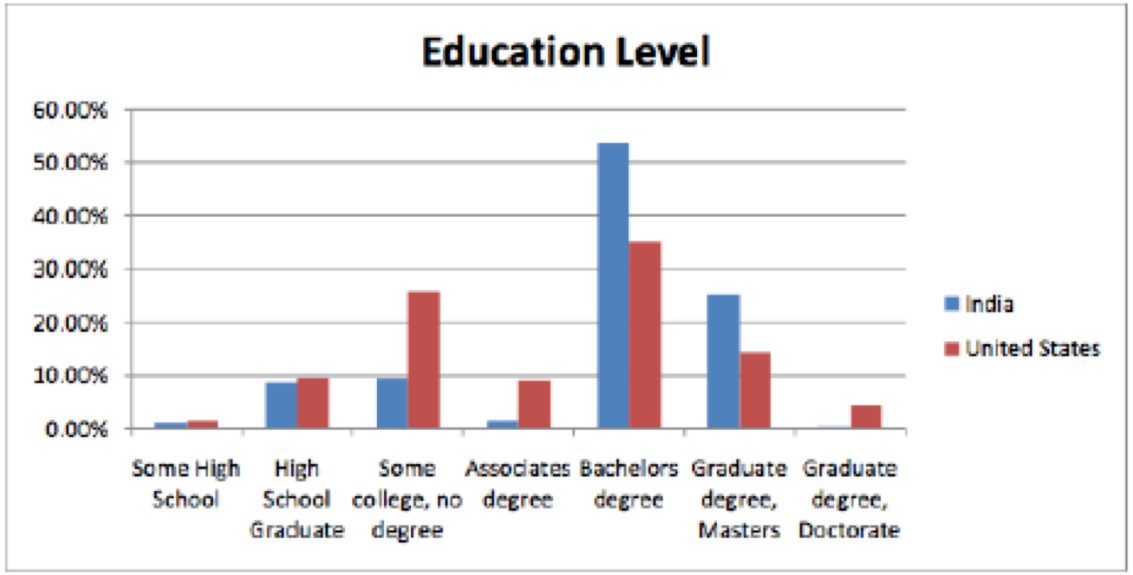
MTurk workers tend to be younger than the overall population

Djellel Difallah et al. Demographics and Dynamics of Mechanical Turk Workers. WSDM 2018.

Surveys on AMT: Education

		Nov 08	May 09	Aug 09	Nov 09
Education	*US*	32% Bachelors, 11% Graduate	34% Bachelors, 14% Graduate	34% Bachelors, 19% Graduate	38% Bachelors, 17% Graduate
	India	69% Bachelors, 29% Graduate	56% Bachelors, 18% Graduate	56% Bachelors, 13% Graduate	45% Bachelors, 21% Graduate

[Ross et al, CHI 2010]

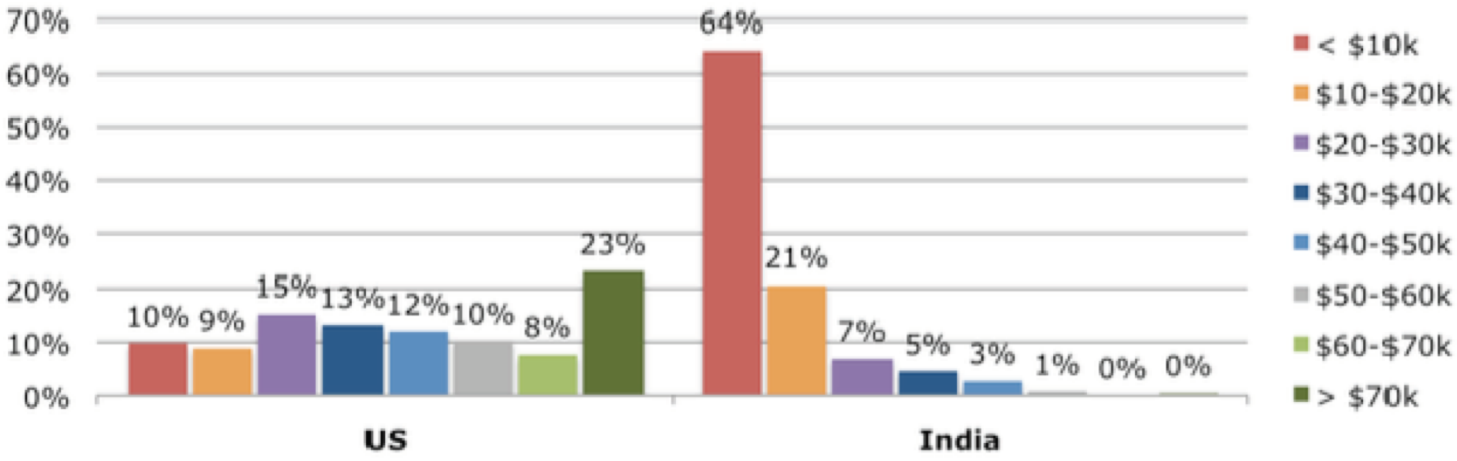


[Ipeirotis, 2010]

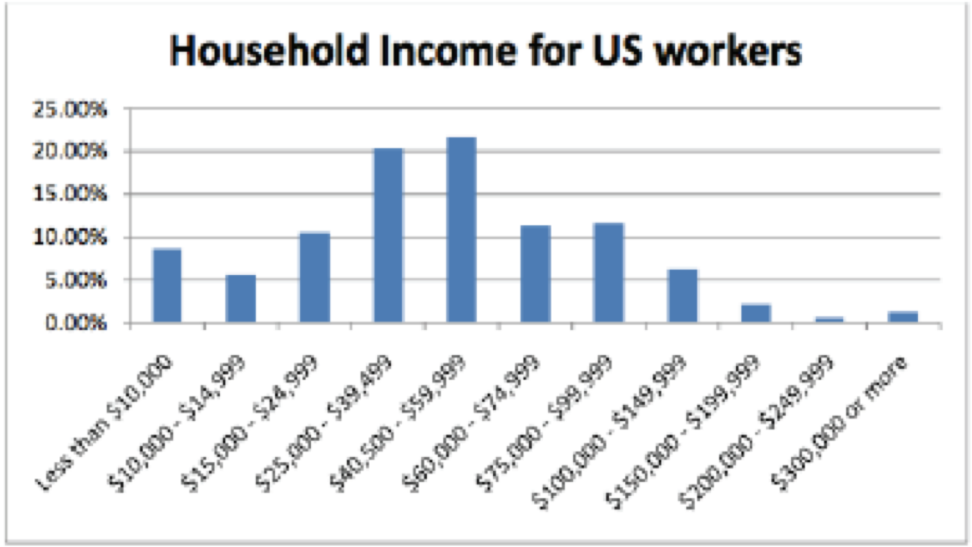
Overall, AMT population was more educated than the average US or Indian population

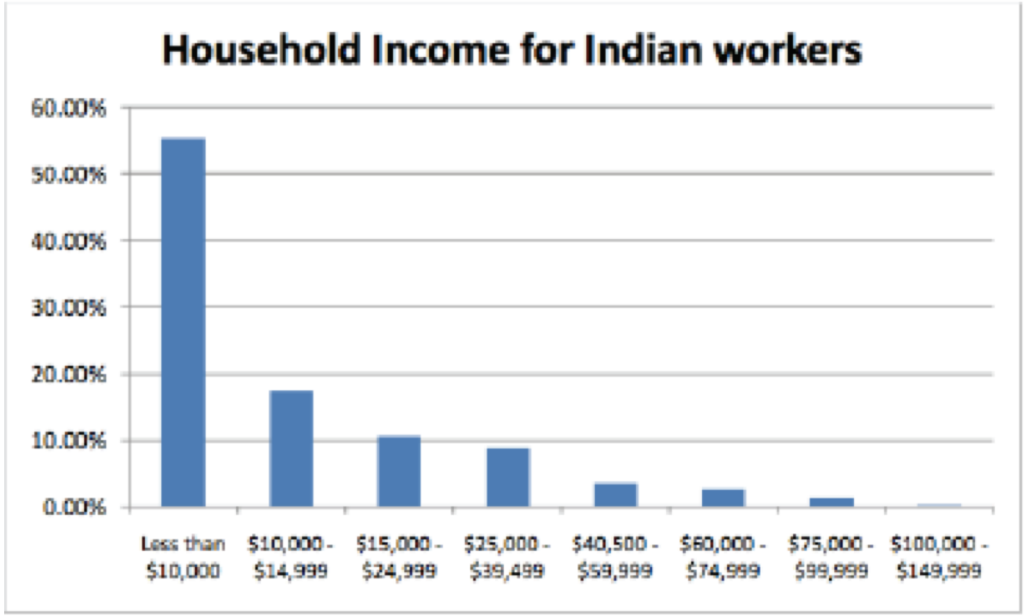
Djellel Difallah et al. Demographics and Dynamics of Mechanical Turk Workers. WSDM 2018.

Surveys on AMT: Income



[Ross et al, CHI 2010]





[Ipeirotis, 2010]

Steady fall in household income, likely due to increase in Indian population which has a different currency valuation

Surveys on AMT: Income

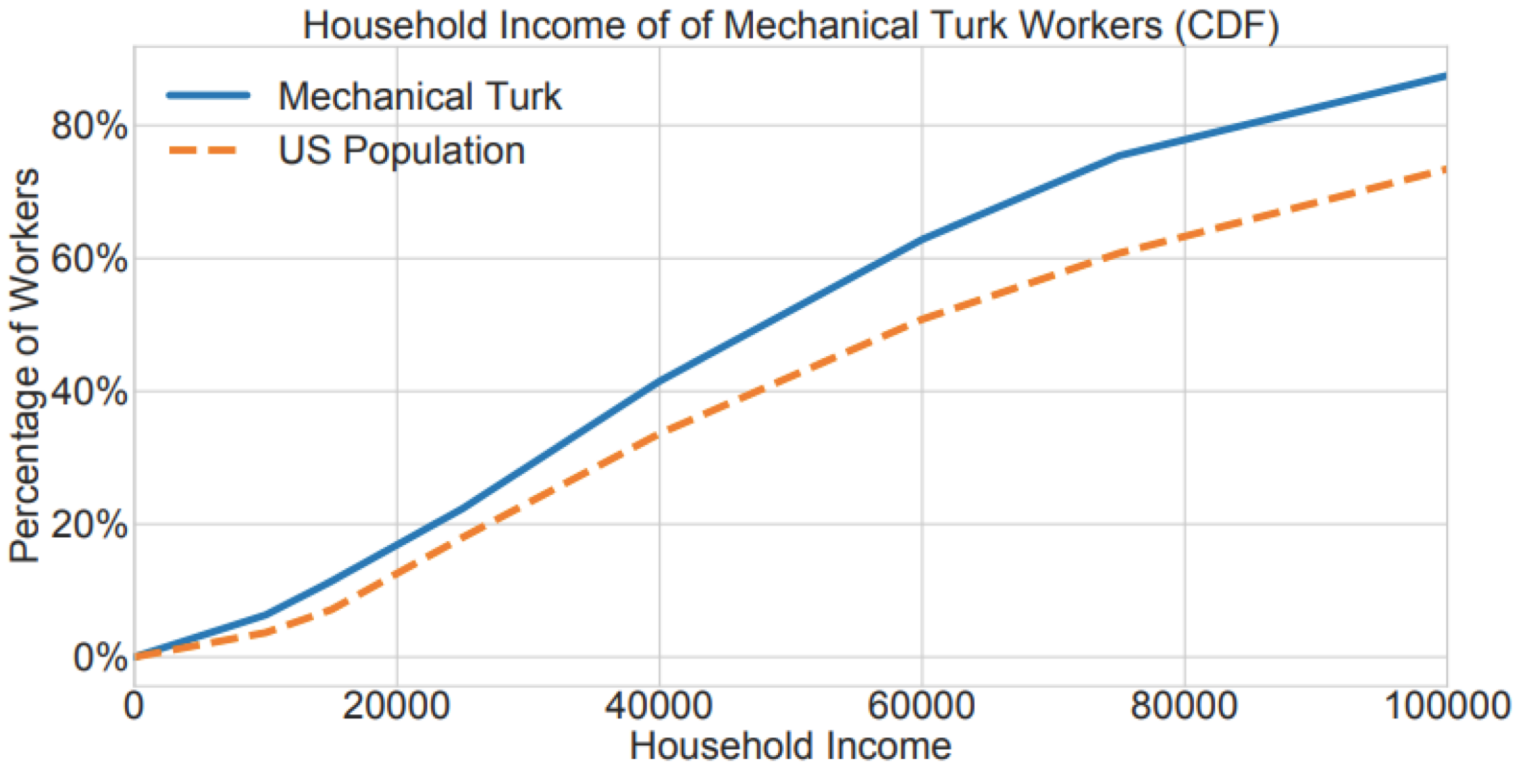
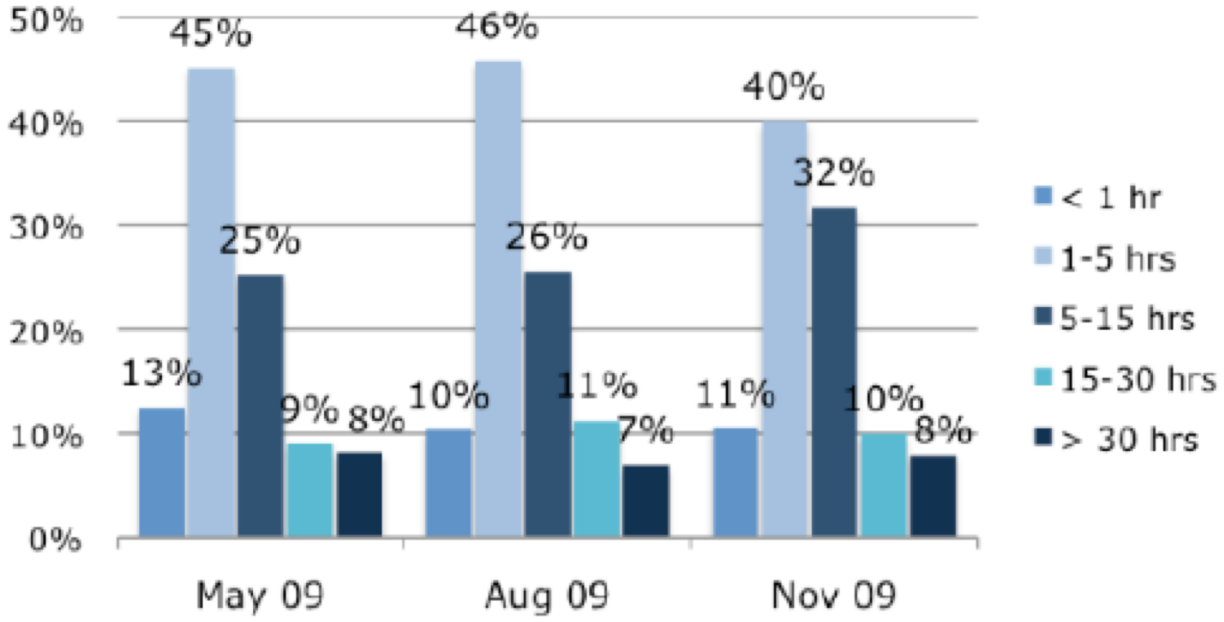


Figure 6: Household Income.

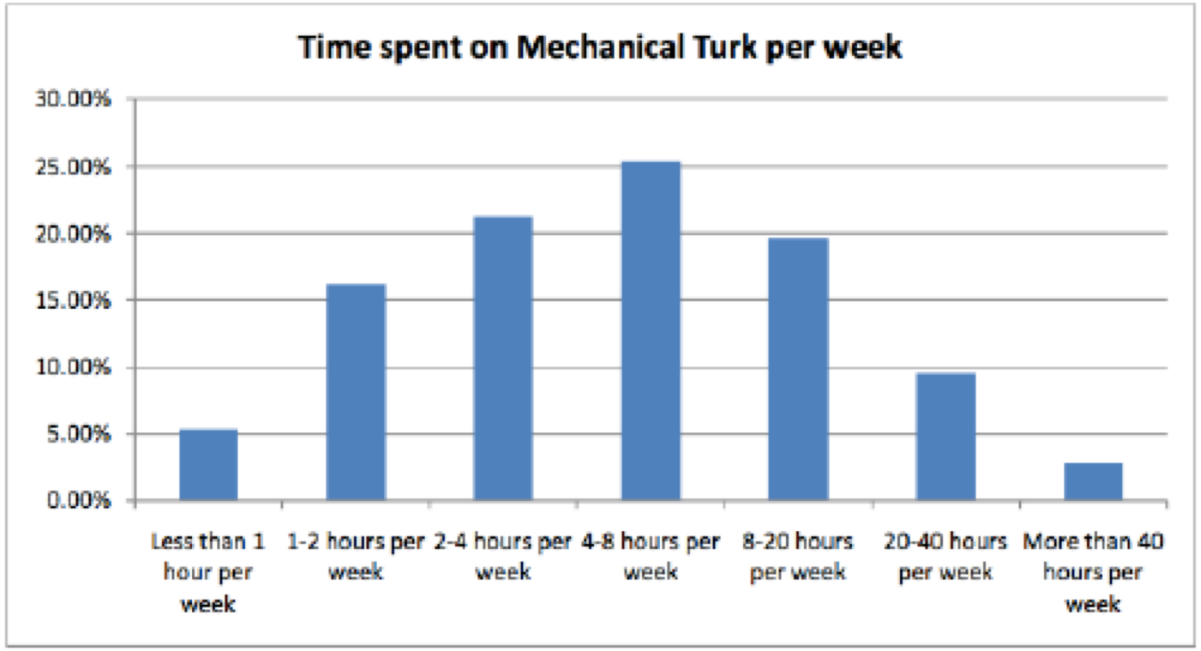
Household incomes for US workers tend to be more than for US population

Djellel Difallah et al. Demographics and Dynamics of Mechanical Turk Workers. WSDM 2018.

Surveys on AMT: Time Spent



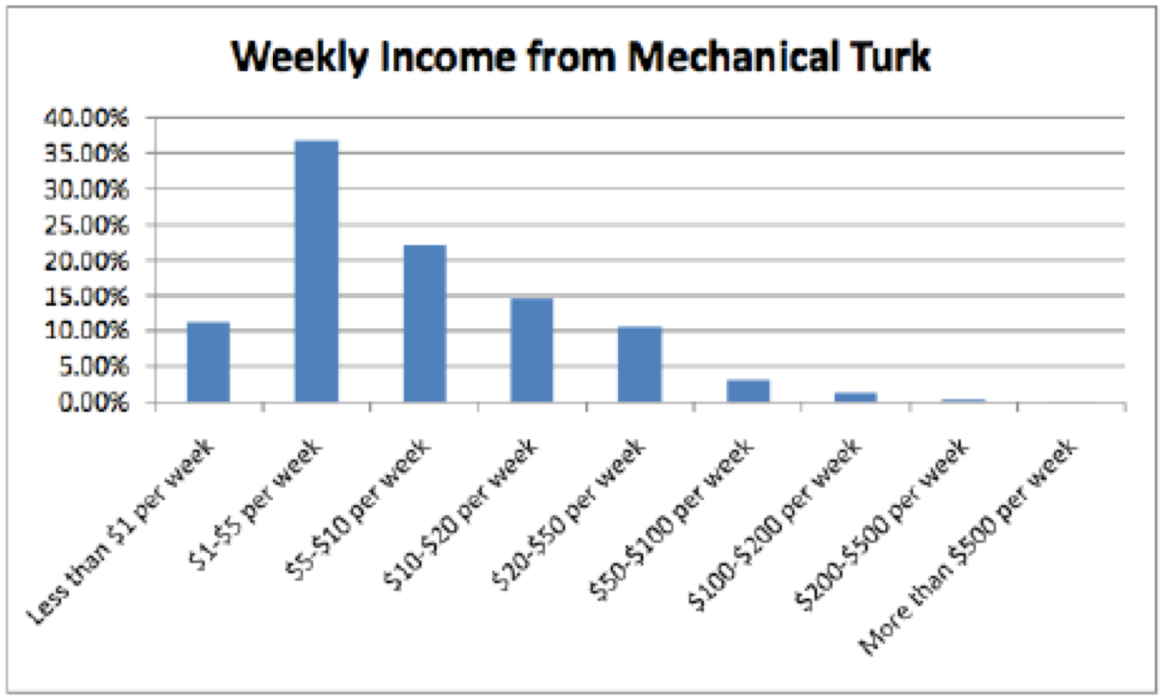
[Ross et al, CHI 2010]



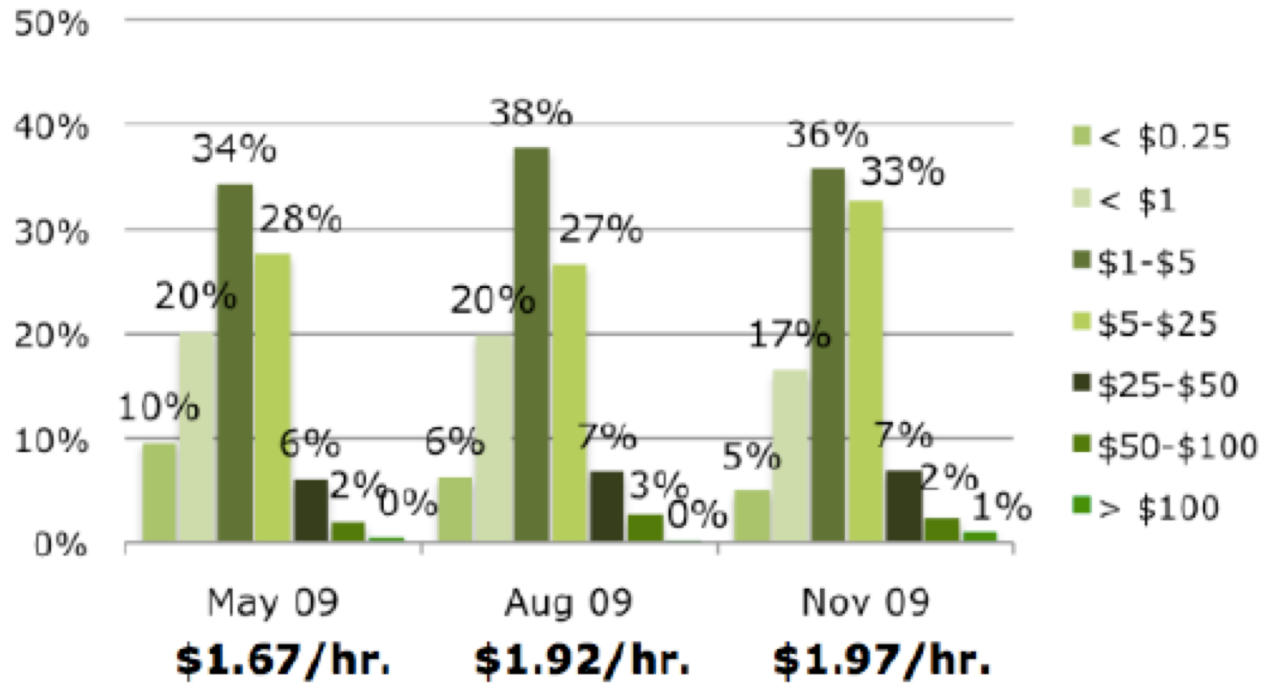
[Ipeirotis, 2010]

Most workers spend a day or less per week working on AMT

Surveys on AMT: Time Spent

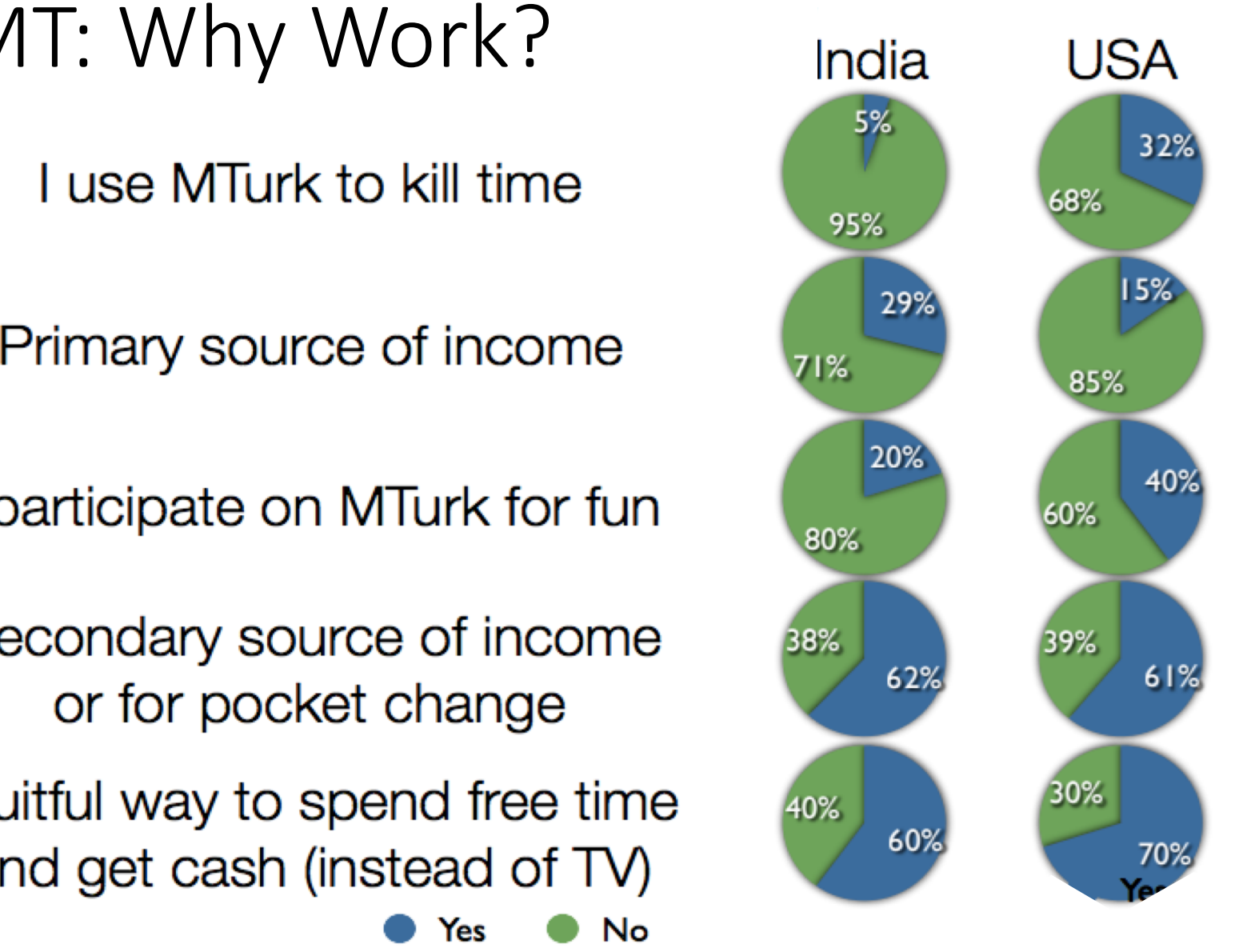


[Ross et al, CHI 2010]



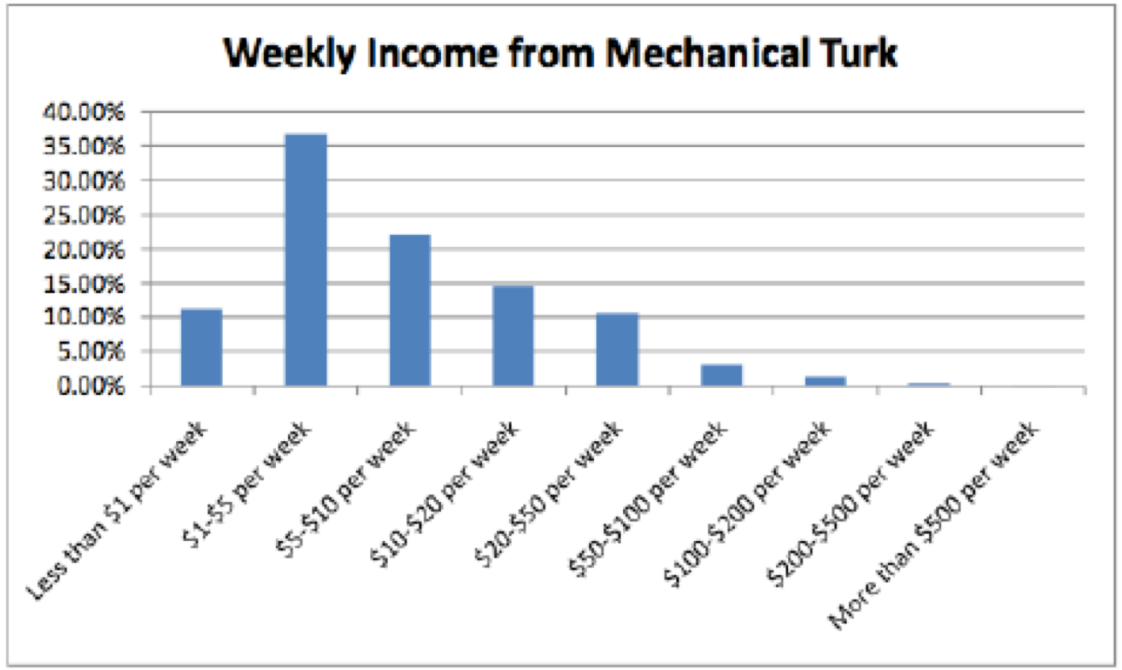
[Ipeirotis, 2010]

Surveys of AMT: Why Work?

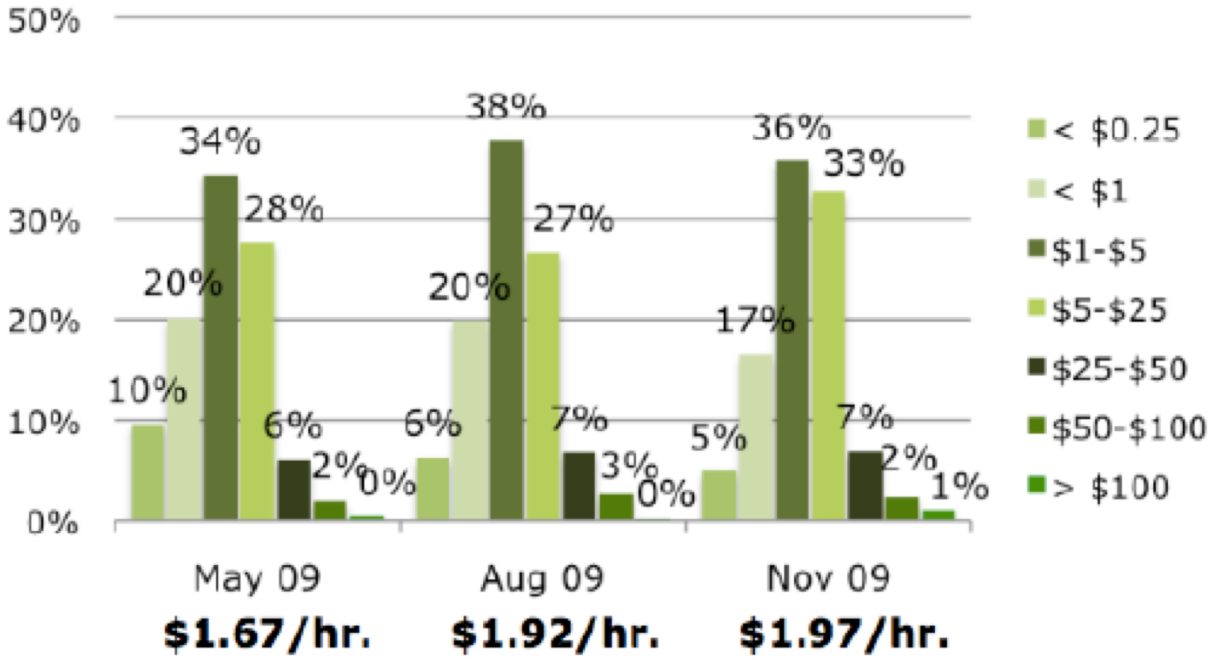


http://crowdsourcing-class.org/slides/crowd-workers.pdf

Surveys of AMT: AMT Wages



[Ross et al, CHI 2010]



[Ipeirotis, 2010]

On average, Turkers earn just under $2.00/hour, with Indian workers earning less than U.S. workers ($1.58/hour vs. $2.30/hour on average in Nov. 2009); labor laws do NOT apply since crowd workers are considered “contractors”

AMT Wages

(results from 3 methods to compute wages using task from Sep 2014 to Jan 2017; 3,808,020 HITs performed by 2,676 unique workers)

	Per-HIT/Cluster ($/h)		
	Median	Mean	SD
Interval (N=3,471,580)	2.54	5.66	24.1
Cluster (D=0; N=2,560,066)	3.18	6.19	26.4
Cluster (D=1; N=635,198)	1.77	4.80	43.4

Table 1. Summary of per-HIT/cluster hourly wage statistics.

Mean wages ranged between $4.80 and %6.19

Kotaro Hara et al. A Data-Driven Analysis of Workers' Earnings on Amazon Mechanical Turk. CHI 2018.

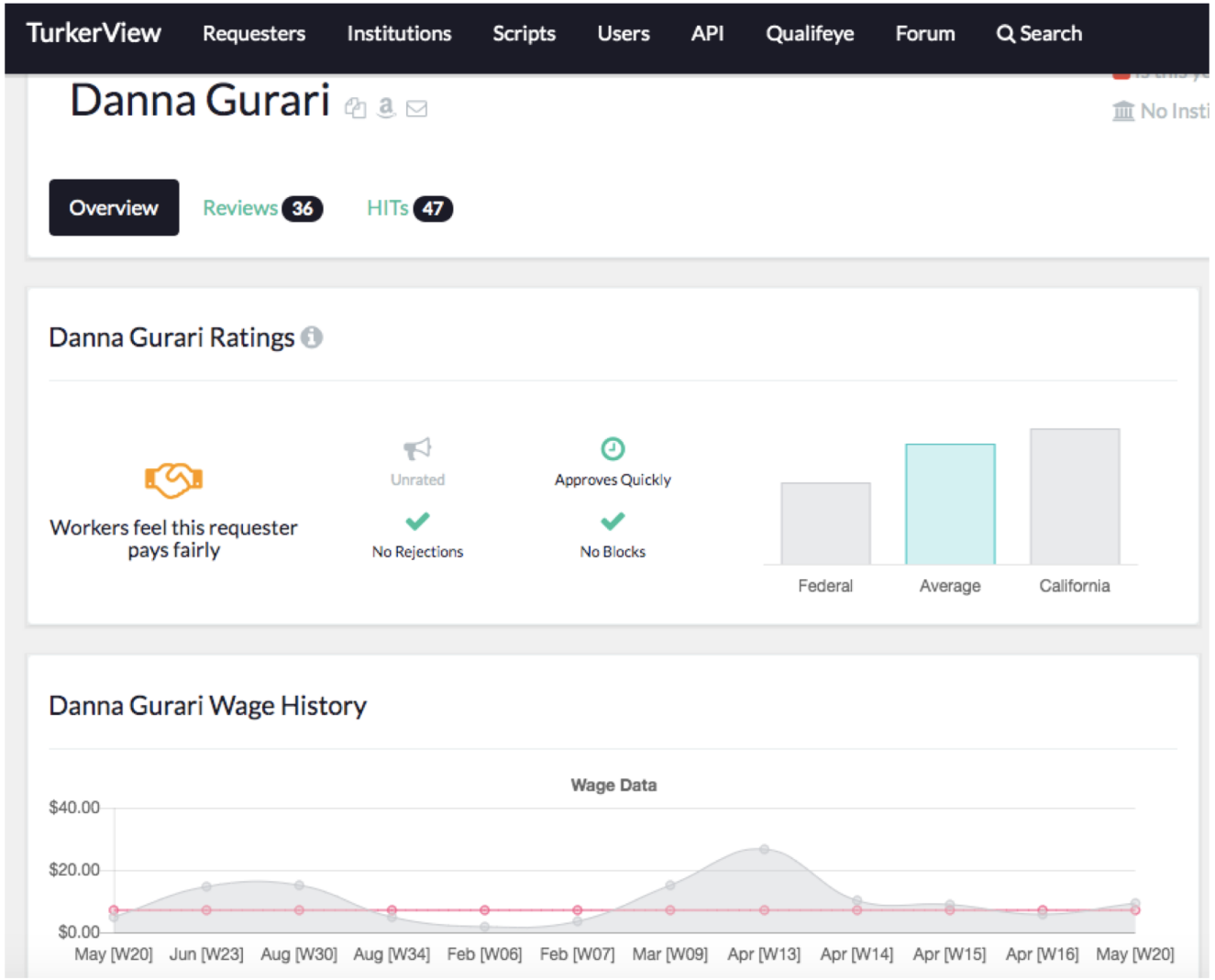
AMT Wages: Strategies to Boost Them

Table 1: Description of Mechanical Turk related browser extension tools (as of February 2018)

Extension name	Description
Turkopticon	A web platform (with API) for reviewing and evaluating requesters and HITs. Also refers to a browser extension that displays pop-ups of the evaluation status on AMT search pages.
Panda Crazy	A userscript that provides an interface for managing and PandA-ing batches of HITs.
MTurk Suite	An extension enhancing AMT pages with features from various scripts and extensions. Includes of Turkopticon, Turkerview, and minor work history and earnings tracking features.
HIT Scraper	A userscript that provides a an augmented search interface for HITs. Hit Scraper includes additonal search filters and can automatication search for new HITs at set intervals.
MTurk Engine	An extension combining HIT Scraper and Panda Crazy features, with an automatic HIT watcher and improved dashboard for managing earnings.
Turkmaster	A userscript that adds a side bar in Mechanical Turk dashboard page. Automatically runs a watcher for new HITs based saved requesters and search keywords. Also supports PandAing HITs.
Greasemonkey/ Tampermonkey	Extensions that enable userscripts. (Required for some userscripts, such as HIT Scraper, HIT-Forker, Overwatch, Panda Crazy and Turkmaster)

Toni Kaplan et al. Striving to Earn More: A Survey of Work Strategies and Tool Use Among Crowd Workers. AAAI 2018.

AMT Wages: Strategies to Boost Them; e.g.,



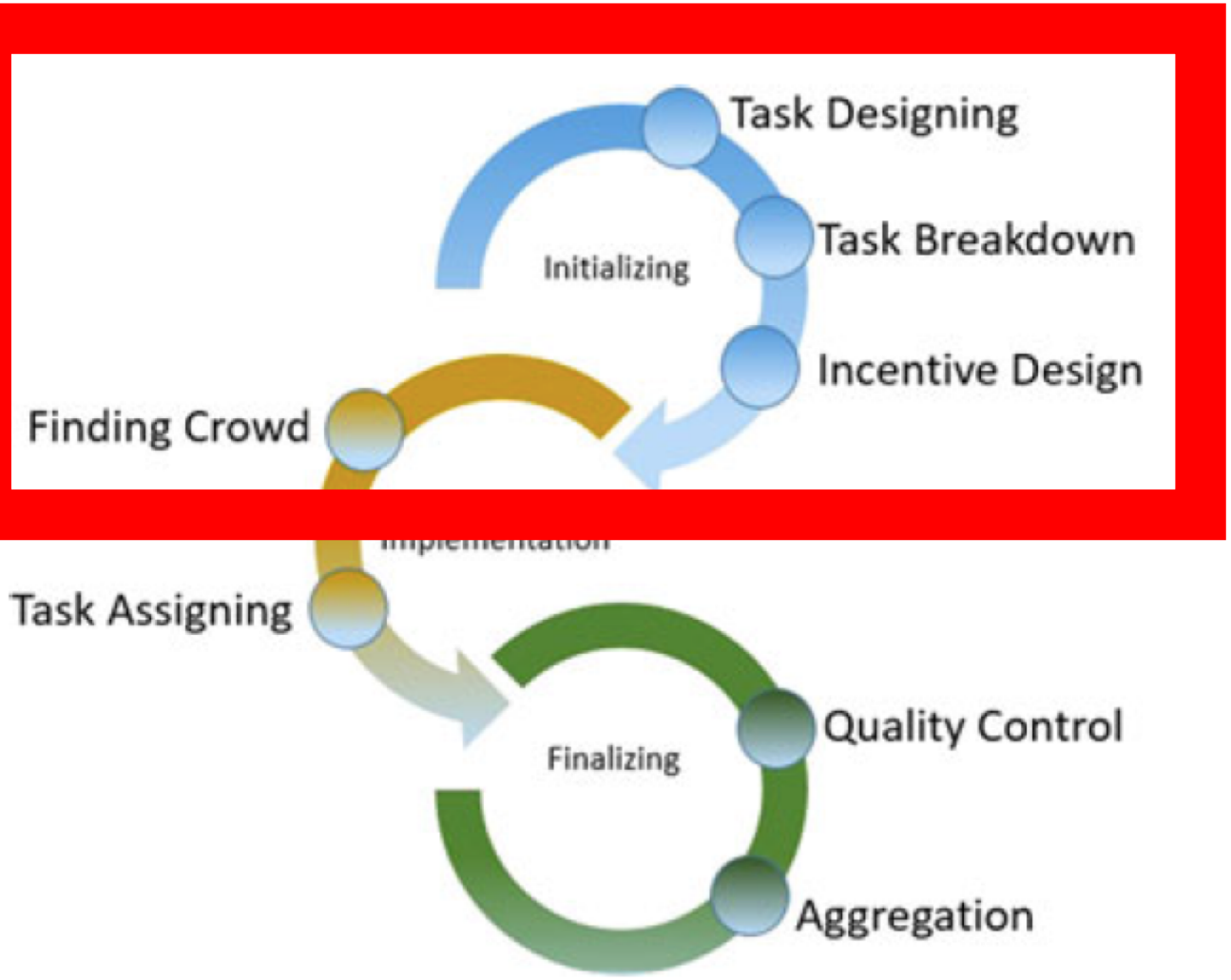
Today's Topics

- Scope of "crowdsourcing" in crowdsourcing for computer vision
- How to recruit a crowd?
- Who is the crowd?
- How to collect high quality results with a crowd?
- Lab: Alegion platform and connecting to Amazon Mechanical Turk

Crowdsourcing System Design

Anand I. Chittilappilly, Lei Chen, and Sihem Amer-Yahia. A Survey of General-Purpose Crowdsourcing Techniques. IEEE TKDE 2016.

Crowdsourcing System Design



Pre-Task

- Instructions
- Training/Qualification tests
- Incentives
- Required qualification/skills criteria
- Honeypot tasks

Anand I. Chittilappilly, Lei Chen, and Sihem Amer-Yahia. A Survey of General-Purpose Crowdsourcing Techniques. IEEE TKDE 2016.

Crowdsourcing System Design

Post-Task

- Honey pot tasks
- Aggregate redundant responses
- Manual review
- Automated review

Anand I. Chittilappilly, Lei Chen, and Sihem Amer-Yahia. A Survey of General-Purpose Crowdsourcing Techniques. IEEE TKDE 2016.

Today's Topics

- Scope of "crowdsourcing" in crowdsourcing for computer vision
- How to recruit a crowd?
- Who is the crowd?
- How to collect high quality results with a crowd?
- Lab: Alegion platform and connecting to Amazon Mechanical Turk