



Purdue Fall 2018

CS59000-CSC: Crowdsourcing and Social Computing
<http://mingyin.org/CS590/Fall2018/index.html>

Class 6: Crowdsourcing platform: Opportunities and challenges

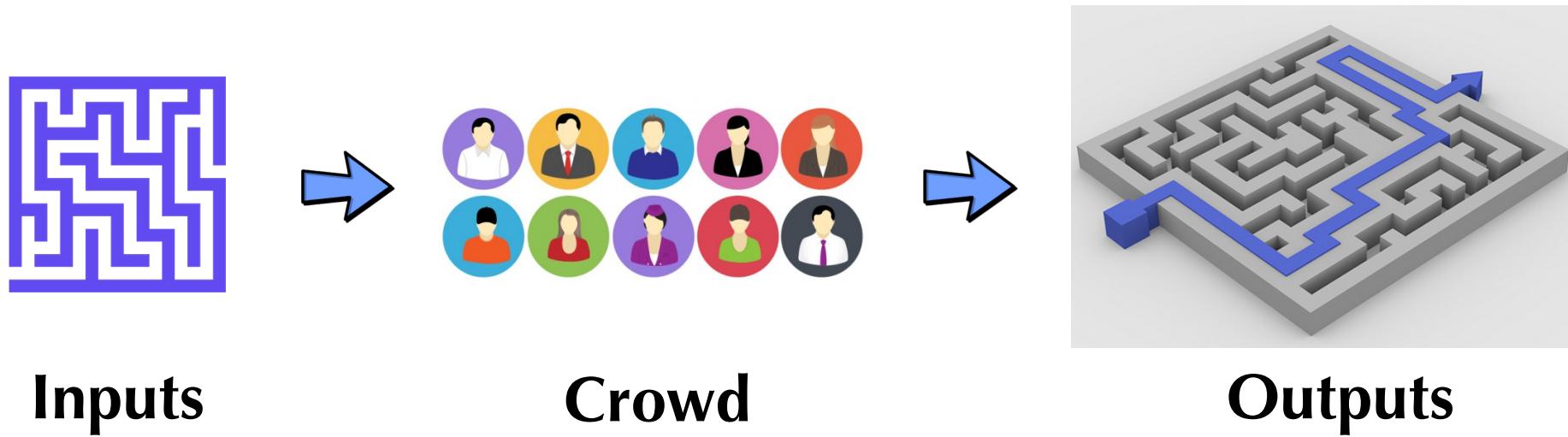
2018.9.10

Ming Yin

Administrative Notes

- Participate in the poll about Final Project Pitch Day on Piazza!
- Reminder:
 - Assignment 2 is due on this Friday (11:59pm, Sep 14): send it to the course email
 - Send your reading questions to me one week before your presentation date!

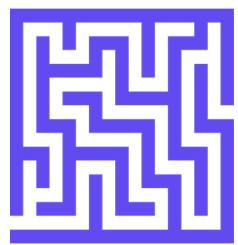
The Future of Crowd Work (2013)



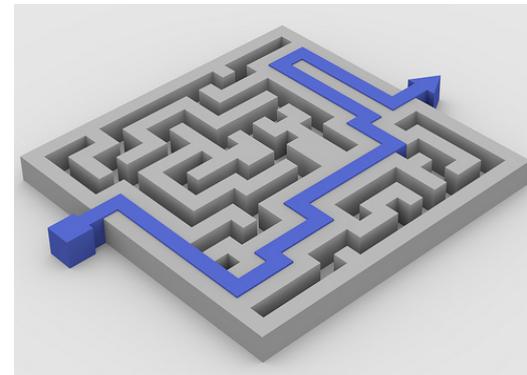
Can we foresee a future crowd workplace in which
we would want our children to participate?

Simple, Independent → Complex, Interdependent

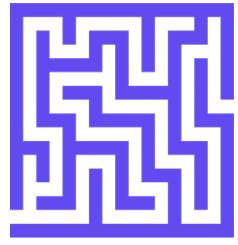
Not Entirely New



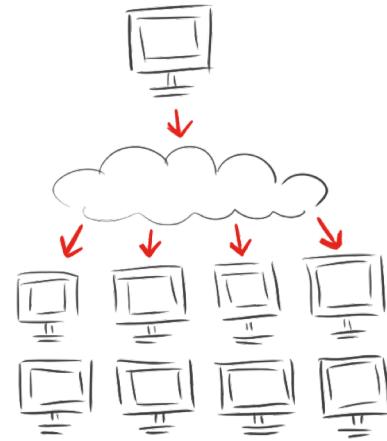
Inputs



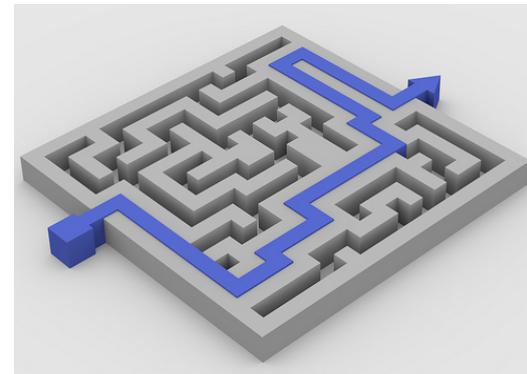
Outputs



Inputs



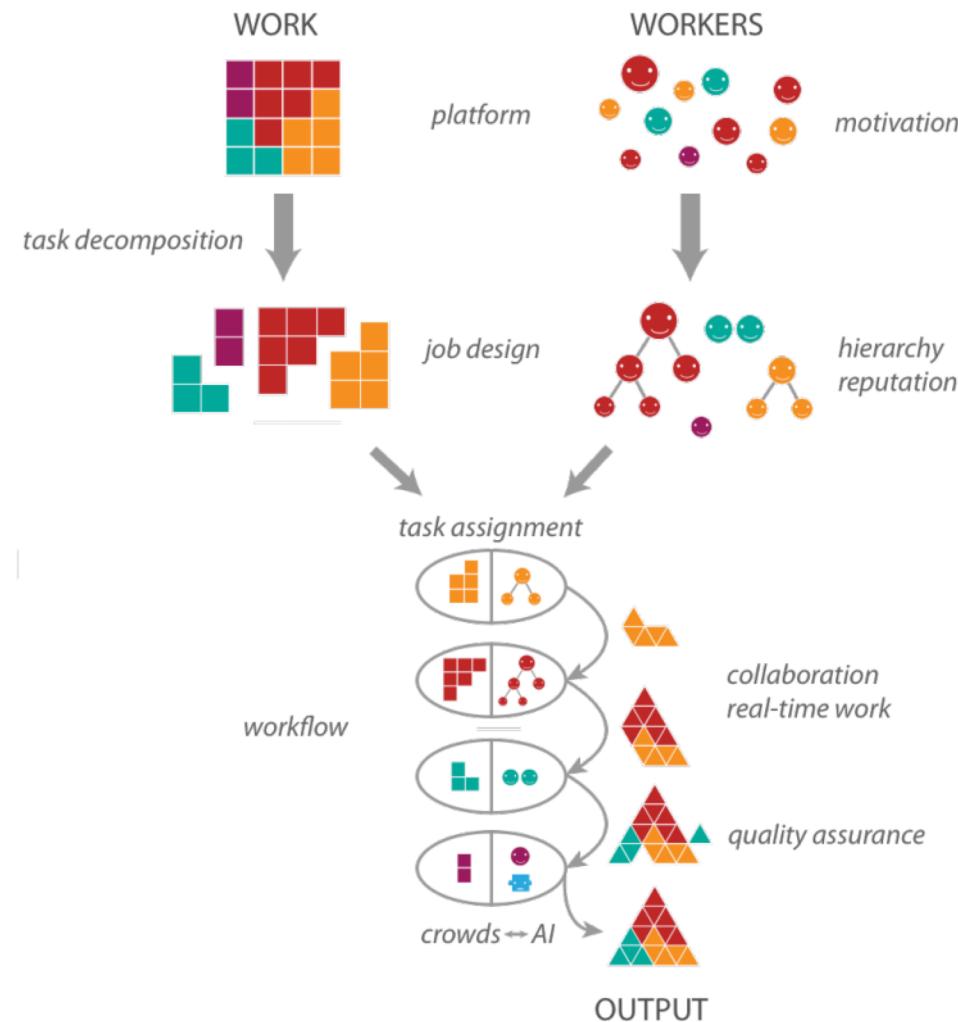
Distributed Systems!



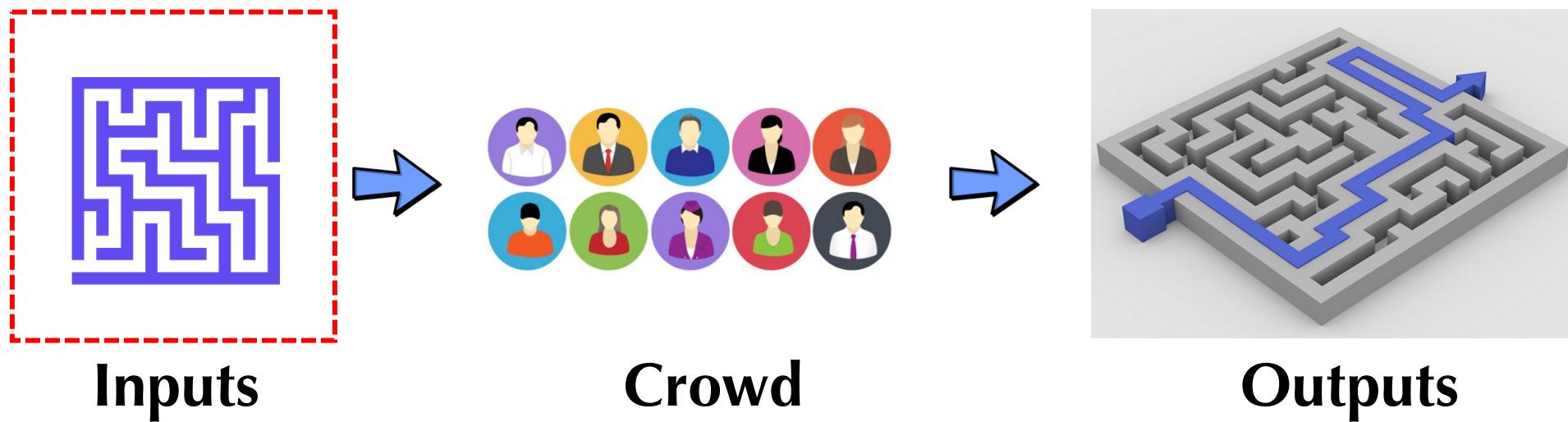
Outputs

Organizational
Behavior
Theory
+
Distributed
Computing!

A Framework for Future Crowd Work

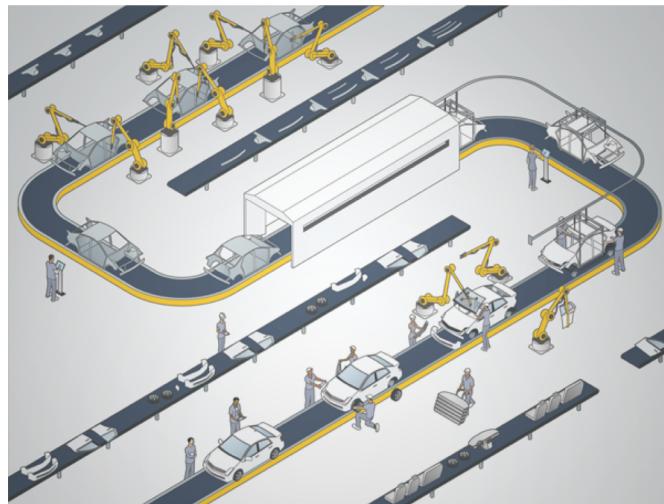


Challenges on the Work (Inputs)

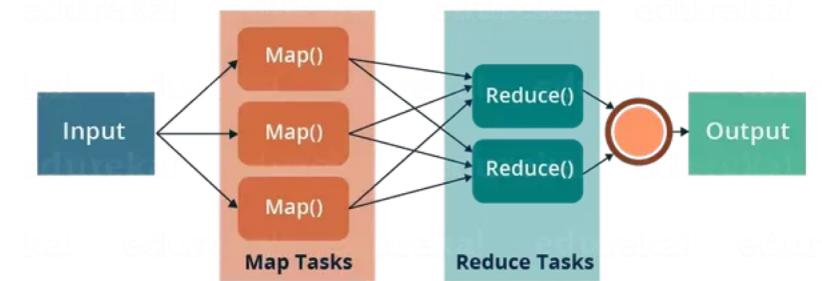


Workflow/Task Decomposition

- How to decompose complex tasks into simpler subtasks, manage the dependencies between subtasks and assemble the results?



Assembly Line (Specialization)



MapReduce (Parallelism)

Workflow/Task Decomposition

- What's the limit: How complex a task can be for it to be handled by crowdsourcing workflows?
 - Workflows for specific use cases (**Oct 22, Md Nasim**)
 - Can be very complex but dependency relationships are relatively simple
- Are there any general patterns that can be reused for different types of tasks?
 - General workflows (**Oct 24, Tianai Zhao**)

Job Design

- How to design tasks that achieve both organizational performance and worker satisfaction?



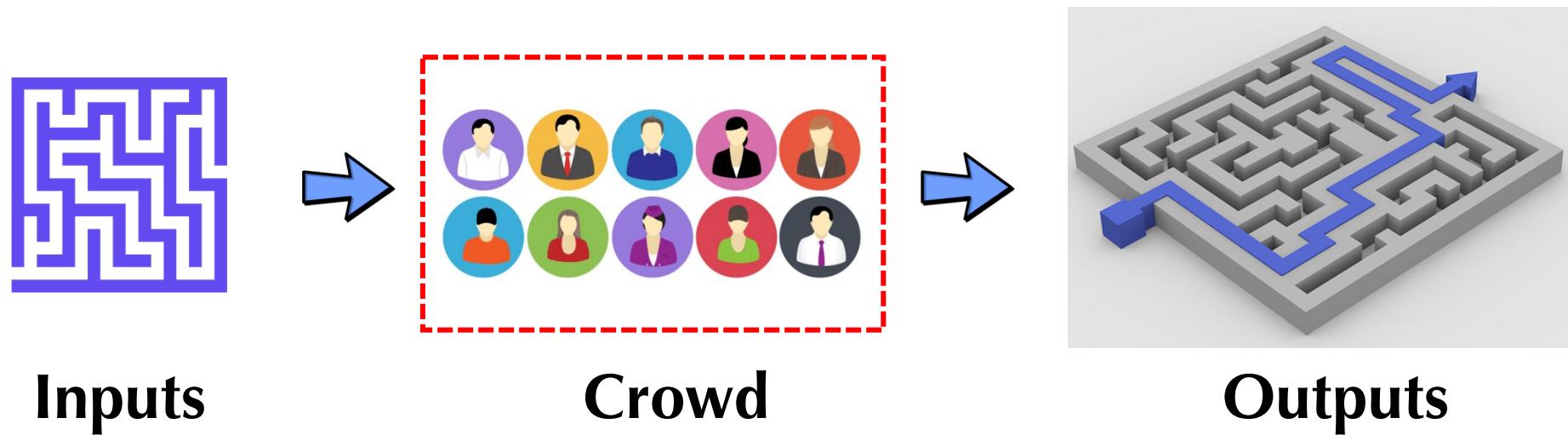
Job Characteristic Theory (1976)

- Skill variety
- Task identity
- Task significance
- Autonomy
- Feedback

Job Design

- Some initial explorations
 - Adding “task significance” (**Sep 17, Tianai Zhao**)
 - Adding “feedback” (**Sep 26, Naman Patwari**)
- What about other dimensions?
- Trade-off of applying work design theory to crowd work?

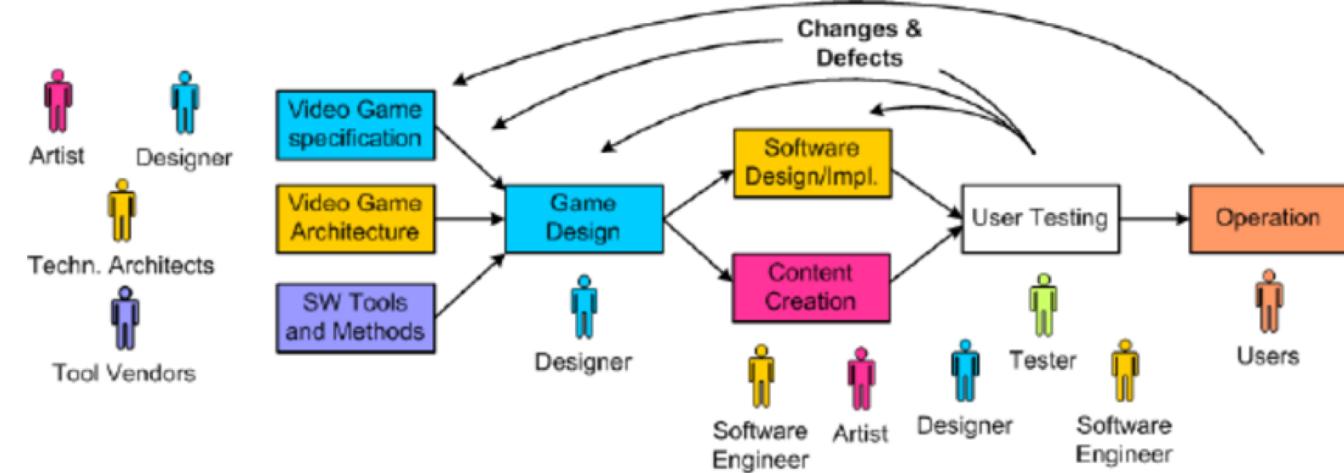
Challenges on the Workers (Crowd)



Motivation and Rewards

- How to appropriately motivate workers?
- Human motivations are diverse
- Self-determination theory
 - Extrinsic motivation vs. intrinsic motivation
 - Extrinsic motivation: financial incentives (**Next class: Ming Yin**)
 - Intrinsic motivation (**Sep 17, Tianai Zhao; Oct 15, KMA Solaiman**)
- Towards Better Incentive Designs in Crowdsourcing
 - Diverse
 - Dynamic
 - Personalized

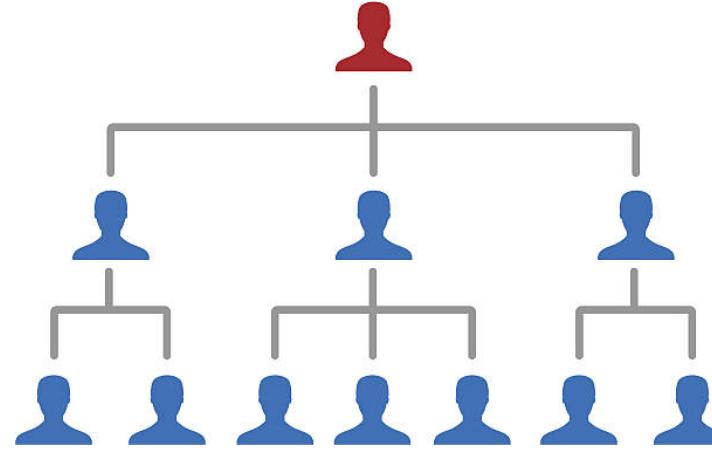
Enabling Collaborations



Complex tasks require more complex collaborations!

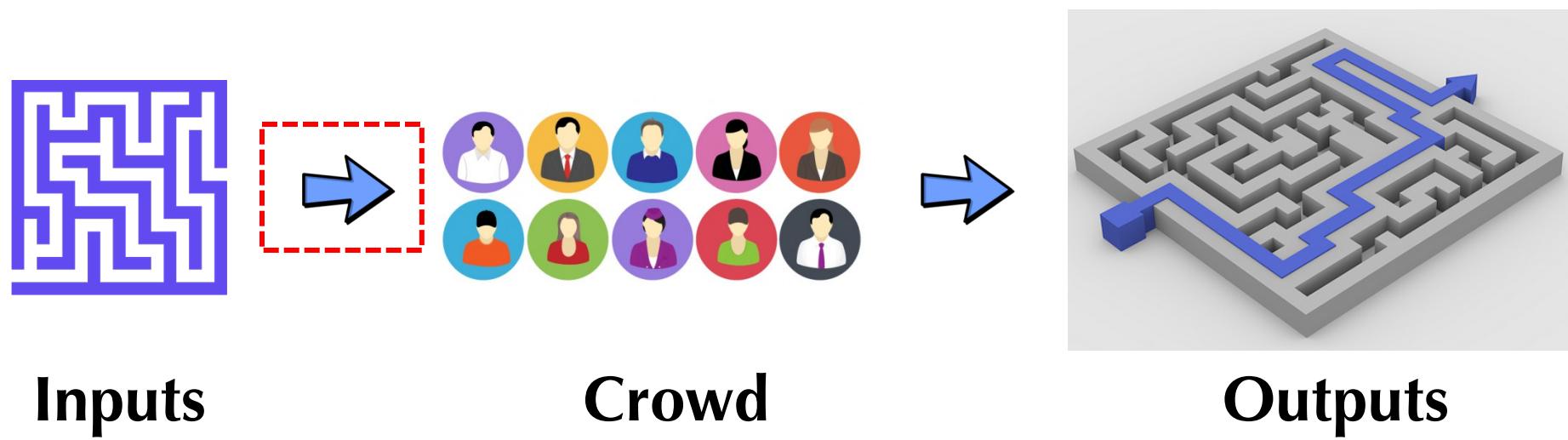
- Structured collaboration (**Oct 31, Amy Rechkemmer**)
- Loosely-structured or unstructured collaboration (**Nov 12, Naman Patwari**)
- Key characteristics: Digital, fast-changing, uncertainty
- What can be done to limit the damage of one poor worker?

Hierarchy



- One of the main management strategies in today's organization
- Advantages: Clear responsibility and authority, clear promotional pathway
- Downside?
- Fast-changing hierarchy (**Nov 12, Naman Patwari**)
- What about other organizational structures? When to use what?

Challenges on the Interface between Work and Workers



Task Assignment

- Current status: market model + first-come first served
- Goals:
 - Requesters: Getting work done by qualified workers given certain constraints (e.g., budget, time)
 - Workers: Find work that are interesting
- Some initial explorations:
 - Strategic assignment: Decide how to assign task to workers in an online fashion (**Sep 24, Md Nasim**)
 - From “pull” to “push”: Task recommendation

Realtime Crowd Work

- Some tasks have really tight completion time constraints!

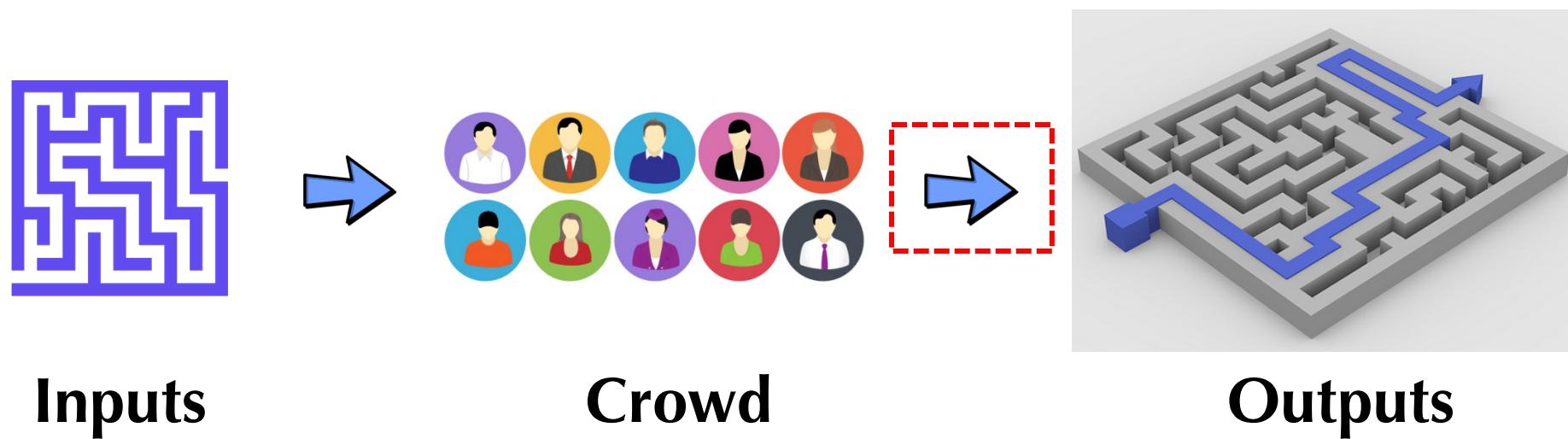


- How to gather a crowd quickly and have the crowd complete the work fast?
- An example: real-time captioning powered by the crowd (**Nov 19, Ming Yin**)

Platform Design

- Infrastructure changes to enable solutions for other challenges!
 - Enable the adoption of incentives beyond financial rewards
 - A platform-wise hierarchy of workers
 - Platform-supported task-worker matching mechanisms
- Reputation and Credentials
 - A platform-wise reputation system for both requesters and workers
 - Robustness: How to deal with gaming?
 - Trade-offs?
 - Some initial ideas: Worker-led reputation (**Nov 26, Ming Yin**)

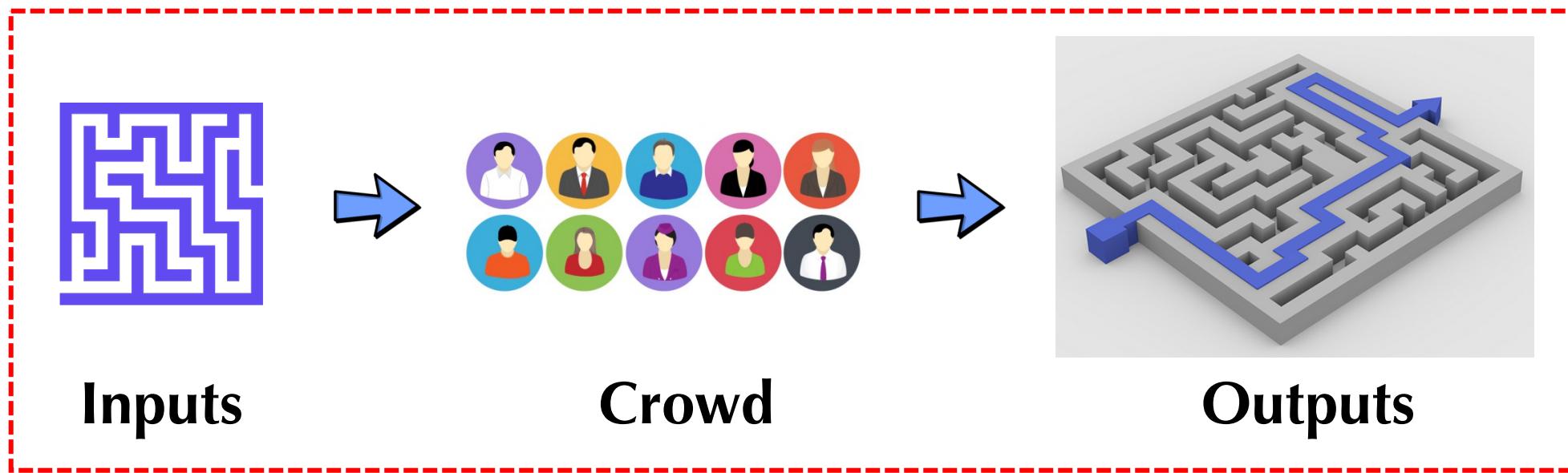
Challenges on the Interface between Workers and Outputs



Quality Assurance

- Upfront task design: Task decomposition, job design, motivation and rewards, etc.
- Post-hoc result analysis
 - Filter out unreliable answers through gold standard questions
 - Infer worker skills and aggregate answers (**Oct 1, Aldo Porco**)
 - Infer quality through behavior
 - What about collusion?

Challenges for Computing (the Entire Process)



Crowds Guide AI

- What kind of contributions crowds can make other than contributing training data?
 - Human intuition and biases: why they label in that way?
 - Human value
 - Reveal how human interact with AI

AI Guides Crowd

- Leverage AI techniques to use and organize crowd more intelligently!
- Happens at every component of the process
 - Incentive design (**Sep 19, Altug Gemalmaz**)
 - Quality assurance (**Oct 3, Amy Rechkemmer**)
 - Engagement control (**Oct 17, Altug Gemalmaz**)
 - Workflow design (**Oct 29, Aldo Porco**)
 - Collaborative work (**Nov 14, KMA Solaiman**)

Discussion

- Are there any other challenges you think is critical in the future of crowd work?
- Is it necessary a good thing to “borrow” all the ideas from existing forms of work?
- Thoughts on enabling complex crowd work while preserving some advantages of current crowd work?

Next Steps

- Create Career Ladders
 - Motivation, job design, reputation, hierarchy
- Improve Task Design through Better Communication
 - Quality assurance, job design, task assignment, real-time crowd work, collaboration, platform
- Facilitate Learning
 - Quality assurance, AI guides crowds, crowds guide AI, task assignment, reputation, platform
- Brainstorming: Think about a specific task you would like to crowdsource and pick a goal. How do you want to realize that goal on your chosen task?

Next Class

- Incentive design: Financial incentives
 - Required: Ho et al. [Incentivizing High Quality Crowdwork](#). WWW'15
 - Optional:
 - Mason and Watts. [Financial Incentives and the "Performance of Crowds"](#). HCOMP'09
 - Yin et al. [The Effects of Performance-Contingent Financial Incentives in Online Labor Markets](#). AAAI'13
 - Harris. [The Effects of Pay-to-Quit Incentives on Crowdworker Task Quality](#). CSCW'15