**Motivation**

Crowdsourcing platforms and gig economy: a new way of working, for good...
- Wide and easy access to workers and to work
- Potential innovation accelerator (e.g., Kicklax or Tara)
- New possibilities for research (e.g., Foldit) … and for bad...
- Privacy scandals (e.g., illegitimate accesses to the real-time geolocation traces of riders/drivers (https://tinyurl.com/wp-priv) or de-anonymization[1])
- Denial of workers’ independence (see e.g., the complaints of micro-task workers (https://tinyurl.com/waj-ind))
- Discrimination (e.g., in Uber[2])
- And, yes, major societal/legal issues …

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**Privacy techniques in our toolbox**

- **Differential Privacy**
  - Ensures strong privacy guarantees
  - Easy composition with other algorithms
  - Gives noisy answers to queries (see application in crowdsourcing [3])

- **Homomorphic Cryptography**
  - Strong cryptographic guarantees
  - Only reveals the results of operations
  - Common decryption (via key-shares)
  - Heavy computation time (see application in crowdsourcing [4])

Combining Techniques, Example: Computation of a private sum

**Overview of our approach**

**Our work: Privacy in Assignment**
- For workers
- With no trusted third party
- Realistic quality and computation time

**Pre-Assignment: Partitioning the space of workers**
- With a KD-tree for instance
- Using private sum as building block
- Medians are approximated with noisy histograms

**Assignment: Assigning tasks to partitions**
- Assigning a task to a set of partitions
- Assignment is public
- Quality measure depends on the data model

**Post-Assignment: Enabling contact**
- Workers select assigned tasks they like…
- … and contact them through a private channel (e.g., TOR)

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**Challenges**

**Data Model:**
- Relevant data model? (e.g., add preferences for workers?)
- Constraints adapted to the issue? (e.g., matching that minimizes distance? threshold for skills?)

**Privacy in Assignment:**
- Reducing computation time
- Finding ways to evaluate correctly
- Optimizing the differential privacy budget

**Extend privacy guarantees:**
- Formalize some desired properties (e.g., independence of workers, transparency)
- Choosing an appropriate definition when several co-exist (e.g., discrimination)
- Formalize the attacker model

**Experiments:** Realistic assumptions on data distribution

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**References**