# Private and Truthful Equilibrium Selection for Aggregative Games

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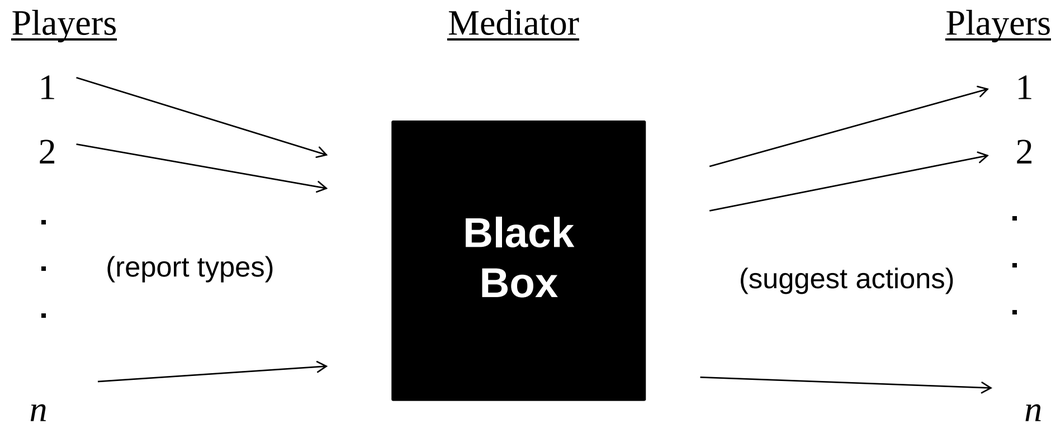
## Aggregative Games

- Succinct representation of players' actions
- Can summarize an $n$-dimensional action profile with a $d$-dimensional vector, for $d << n$
- Generalizes weighted congestion games and anonymous games
- Require additional "largeness" assumptions:
  - Each player has a bounded influence on the summarization vector
  - Player's utility (for a fixed action) is Lipschitz in the summarization vector

## Direct Revelation Mechanisms




## Inside the Black Box

- Exhaustive search (time exponential in $d$, polynomial in $n$)
- For each summarization value $s$ and each objective value $y$, check if it's an approximate equilibrium:

min approx factor $a$

s.t. exists action profile $x$ that is a BR

summarization of $x$ is $a$-close to $s$

objective value at $x$ is $a$-close to $y$

- In math, this is an LP
- We develop novel techniques to solve LPs under the constraint of privacy, using a distributed version of MW

## Privacy and Truthfulness

- **Privacy** ensures that if a player misreports her type, she can't change the equilibrium that is computed (by too much)
- Regardless of your report, other players will take (approximately) the same actions
- No incentive to misreport ➔ Mediator computes Nash equilibrium of the *true* game
- If all other players faithfully follow their suggested action, they form a Nash equilibrium
- Your BR is also play equilibrium strategy (i.e. your suggested action)