

**Show me how you play  
and  
I will tell you who you are**

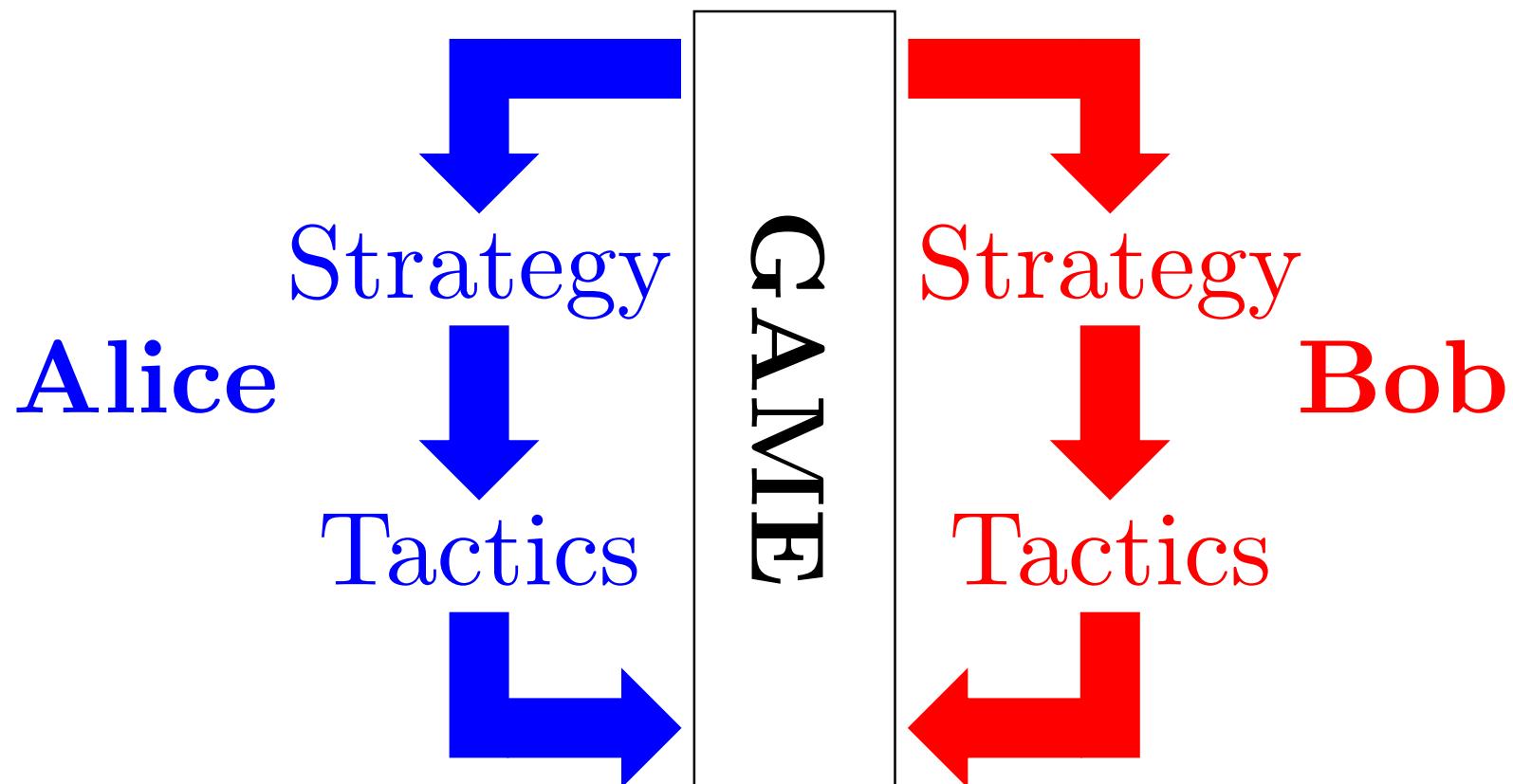
Cédric Lauradoux

June 21, 2011



# Game

## Alice vs Bob



# Game

## Alice vs Bob

- ▶ In every game, you are learning from your opponent and he is learning from you. Capitalizing on this knowledge is the key to victory!

### Sun Tzu

*Know yourself and know your enemy (or challenges), you need not fear the outcome of 1000 battles...*

- ▶ Knowing your adversary's identity provides an critical advantage.

# Game

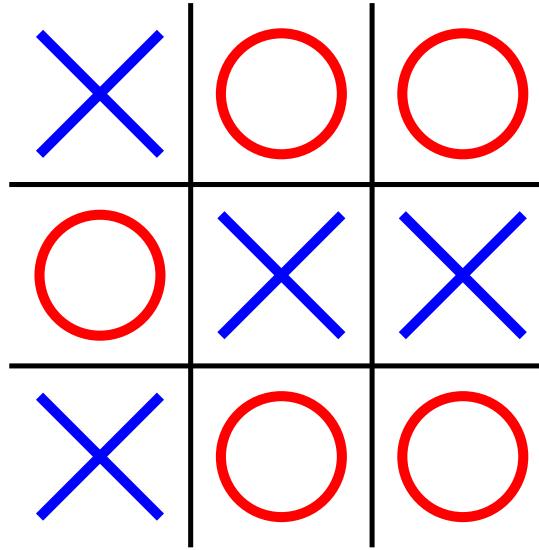
## Alice vs Bob

- ▶ How do you play?

Strategy	Tactics
<i>Rush</i>	<i>Units</i>
<i>Hide and steal the prize</i>	<i>Building</i>
<i>Run for your life</i>	<i>Timing</i>

- ▶ Can we create players profile ?
- ▶ Are those profiles unique ?

# Which games ?



- ▶ Meaning of the game (*see game theory*).
- ▶ The game combinatorics are important:
  - for the entropy on the players identity,
  - with respect to the population size  $N$ .

# Which problem ?

## Problem 1

*From a **reference trustworthy database** (that will be lovely), identify your opponent is within the database.*

**Bonus:** obtain the real player identity. . .

## Problem 2

*From the games played online, identify your opponents later.*

► Let us have a look on **Problem 1!** We need:

- a game: **chess** (Cédric Lauradoux FIDE 2133)
- a database. . .

# Chess

## The Drosophila of online game privacy

**John McCarthy**

*chess as the Drosophila of AI, speaking metaphorically about the importance for genetics of Thomas Morgan's early research with fruit flies, for which he won the Nobel Prize in 1933.*

- ▶ Chess is finite!
  - $8 \times 8$  board;
  - 6 “units”,
  - complexity:  $2^{155}$  (Shannon’s Number)

# Online Chess

► Where can I play online chess ?

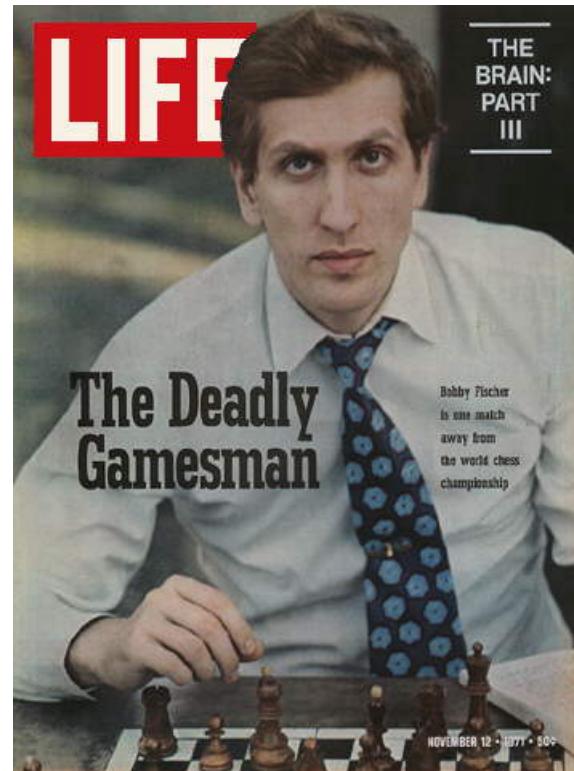
- Internet Chess Club (tournament players)
- europe-echecs.com (french players)
- yahoo chess (anybody)

► Motivations for anonymity in online chess:

- test chess novelties;
- “fair chess”;
- you are greedy;
- that your right.

► So now you are connected as *guest64* . . .

# Searching for Bobby Fischer



- ▶ Several grandmasters (including Nigel Short and Robert Fontaine) that the player known asa “fischer” on ICC was really Bobby Fischer on ICC in 2001. The question will never find its answer. . .

# Chess database

## The Week in Chess

Daily Chess News and Games. Weekly digest for download. By  
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**TWIC 866 13th June 2011 - 2226 games**

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### Watch live games

Event	Site	Rd	UK Time
NEW LIVE GAMES SERVER			
5th Kings Tournament	Medias	9	Mon 1:30pm
Cez Trophy	Prague	6	Sun Ended
ch-UKR	Kiev	10	Mon 1pm

The Safest  
Grünfeld

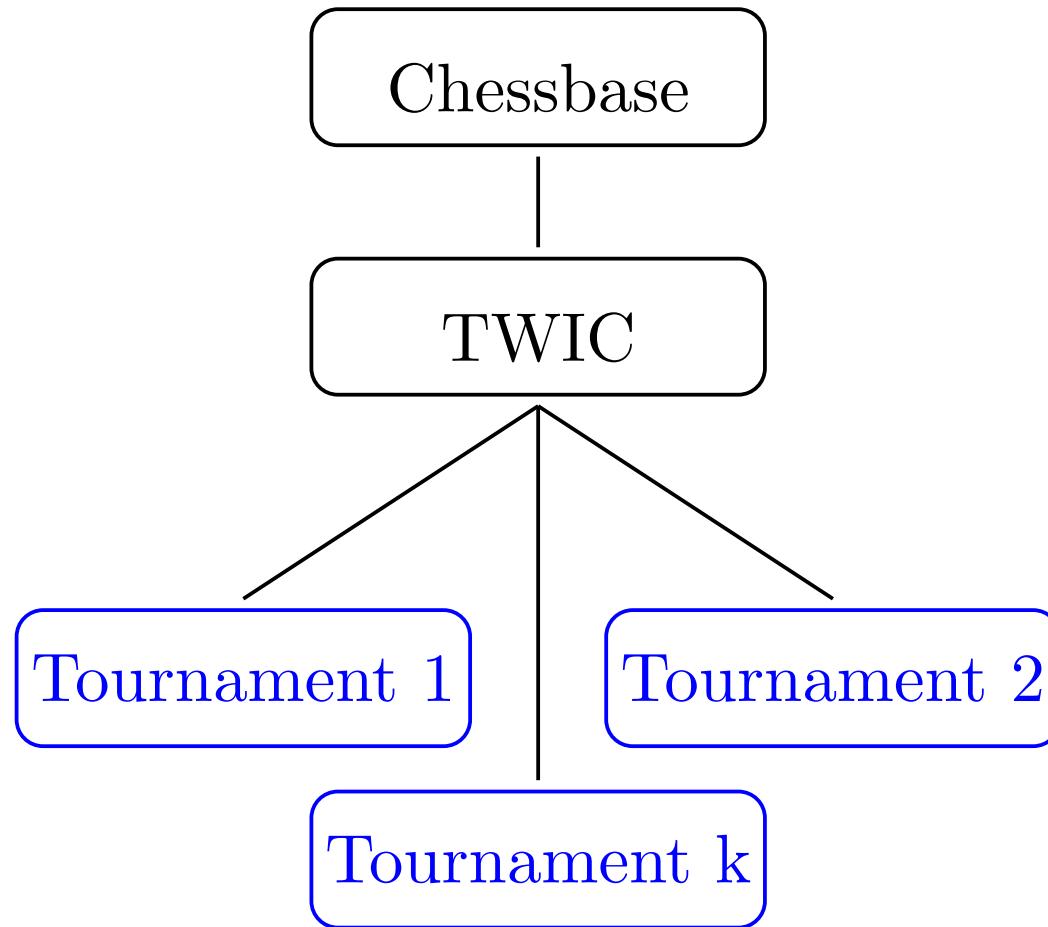


Alexander Delchev  
Evgenij Agrest  
The Safest  
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# Chess database



- ▶ Free and easy to access information.

# Chess database

► About Cédric Lauradoux:

- I am French;
- I was born in 1980;
- I was in
  - Clermont Ferrand in 2001;
  - Avoine in 2001;
  - Avoine in 2002. . .

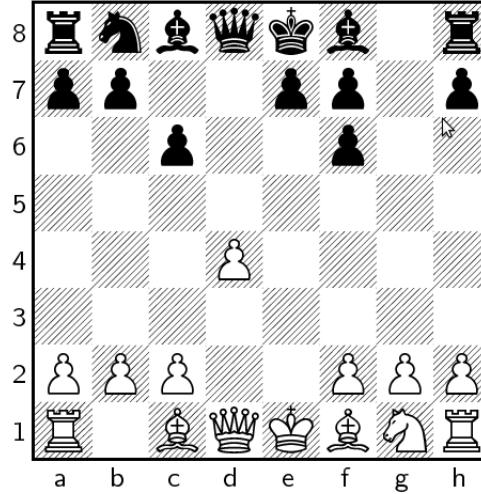
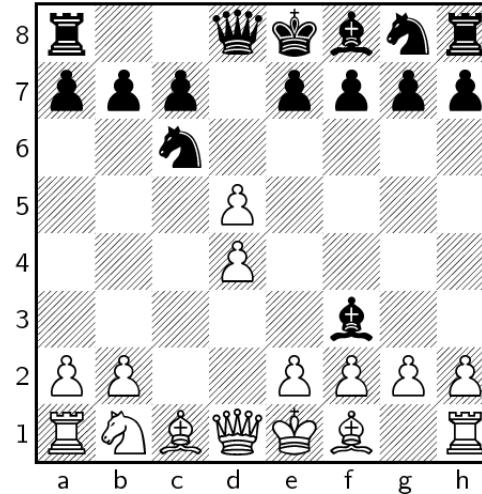
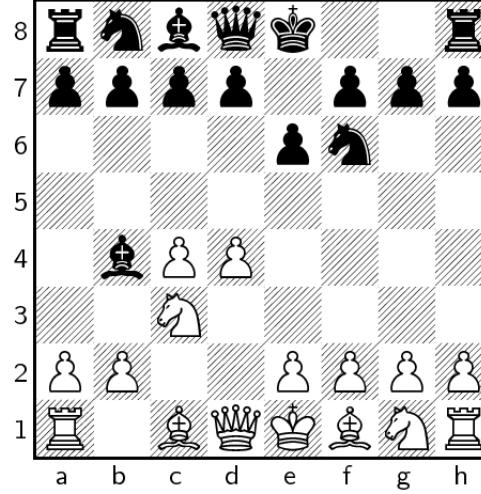
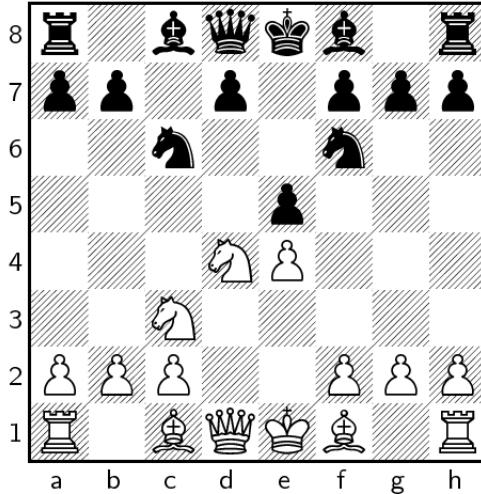
► Sometimes, I was playing chess instead of studying. . .

# Chess: the Drosophila of online game privacy

		Chess	Starcraft II
Complexity	Combinatorial Area Players	known Board 2	unknown Many maps up to 8
Database	Source Quality Size	Week in Chess Good Large	Battlenet Poor Small

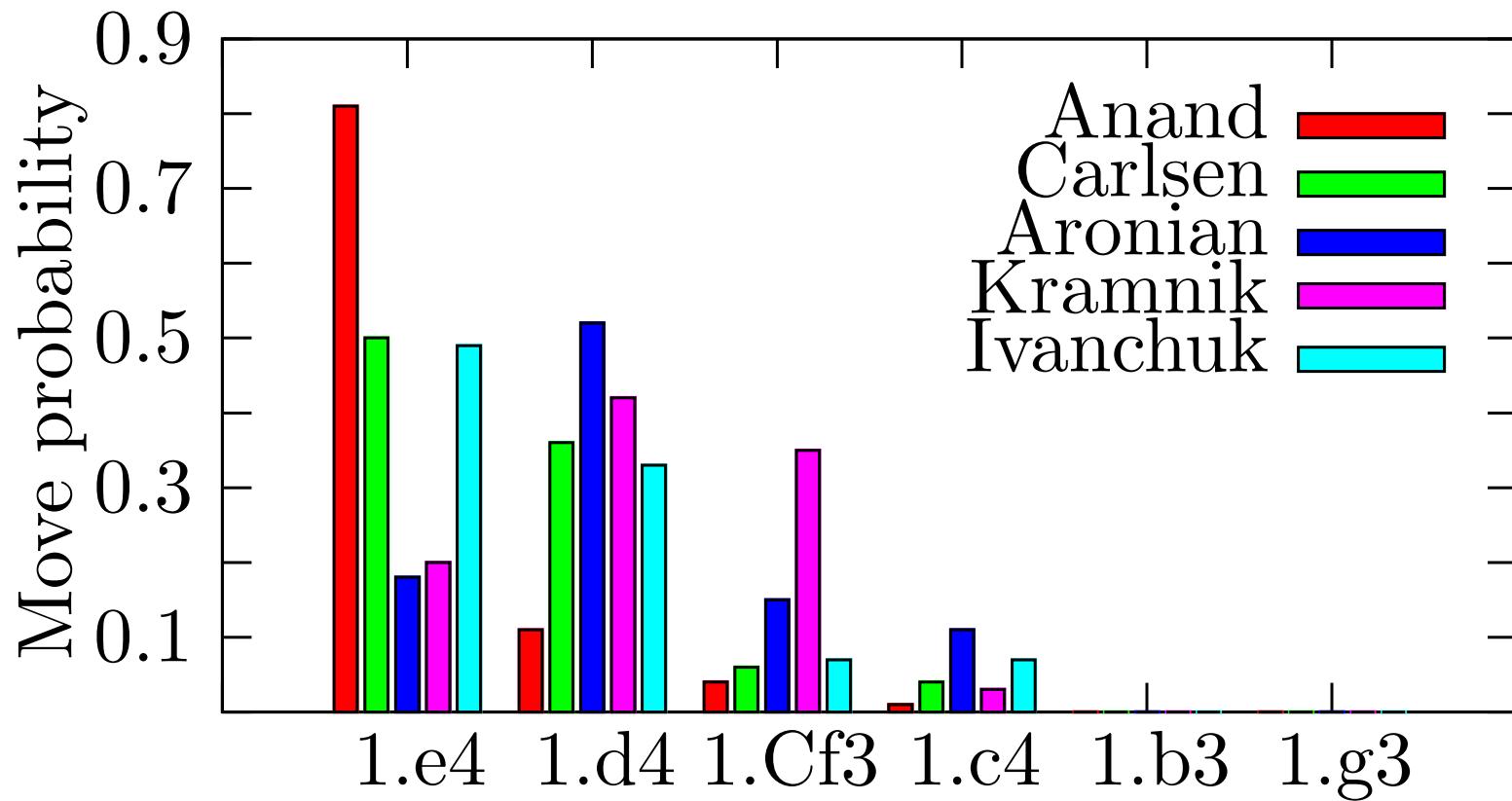
- ▶ Clearly a better idea to study chess!

# Player characteristics



# Player characteristics

- ▶ Analysis over large chess database of games:



# Player characteristics

- ▶ **Opening:** the first fifteen moves of tournament players are all coming from the encyclopedia of chess opening.
- ▶ **Ending:** what have you studied ?
- ▶ **Balancedness:**  $\ell_{white} - \ell_{black}$ .
- ▶ **Equivalence:** Do you prefer a queen or two towers?
- ▶ **Pieces statistics:** the eternal question do you prefer a knight or a bishop.

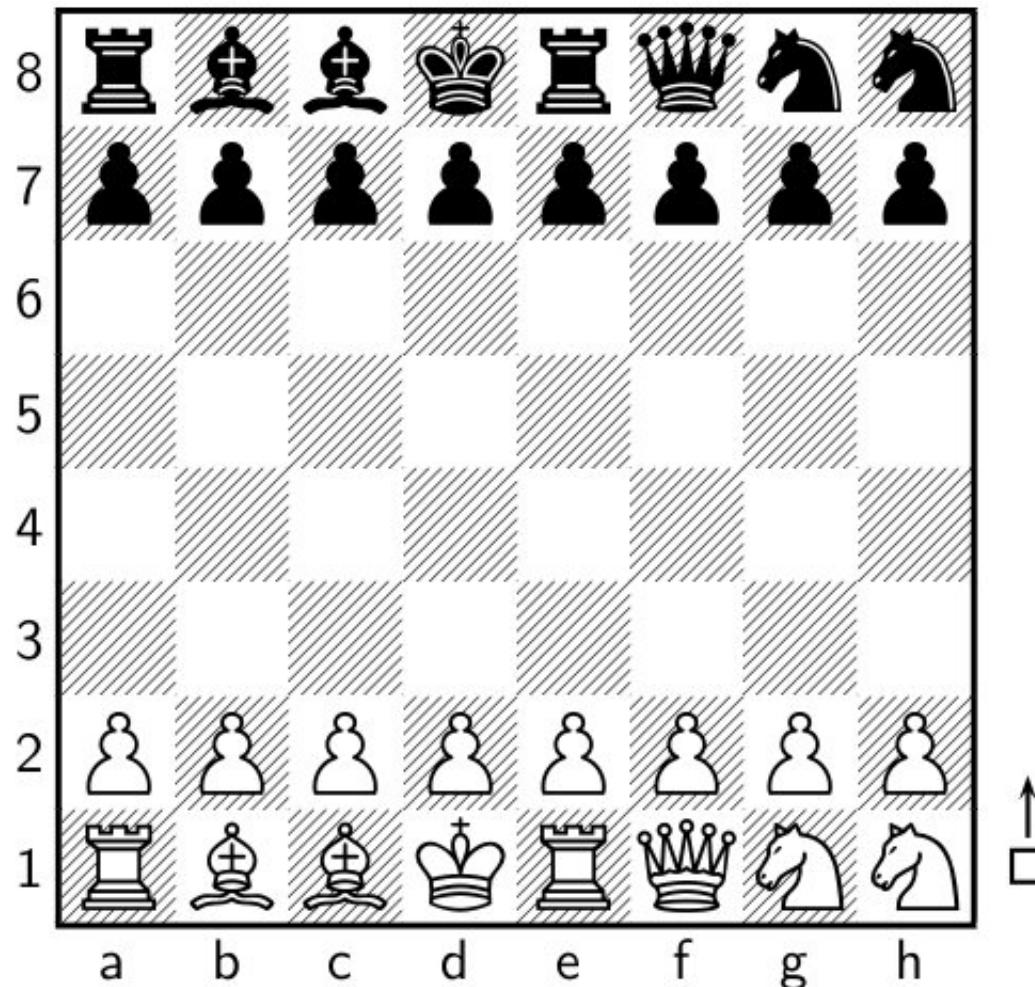
# Solution

## Database

None for the database. . .

# Solutions

A certain vision of randomization. . .



# Solutions

## Bots

- ▶ **Is it so difficult to play like Cédric Lauradoux?**
- ▶ Fortunately/sadly, I have not a high complexity:
  - only, 1Kb of opening tree,
  - little bit harder to program a computer to make my typical blunders!
- ▶ Are you playing against me or one of my bots?

# Conclusion

- ▶ Chess is a very funny problem to understand de-anonymization problem!
- ▶ How fast can we identify a player?
  - from the database;
  - on the fly (by learning).
- ▶ Can we predict which game is dangerous for players privacy ?