

Matchmaking in multi-player on-line games:

Studying user traces to improve the user experience

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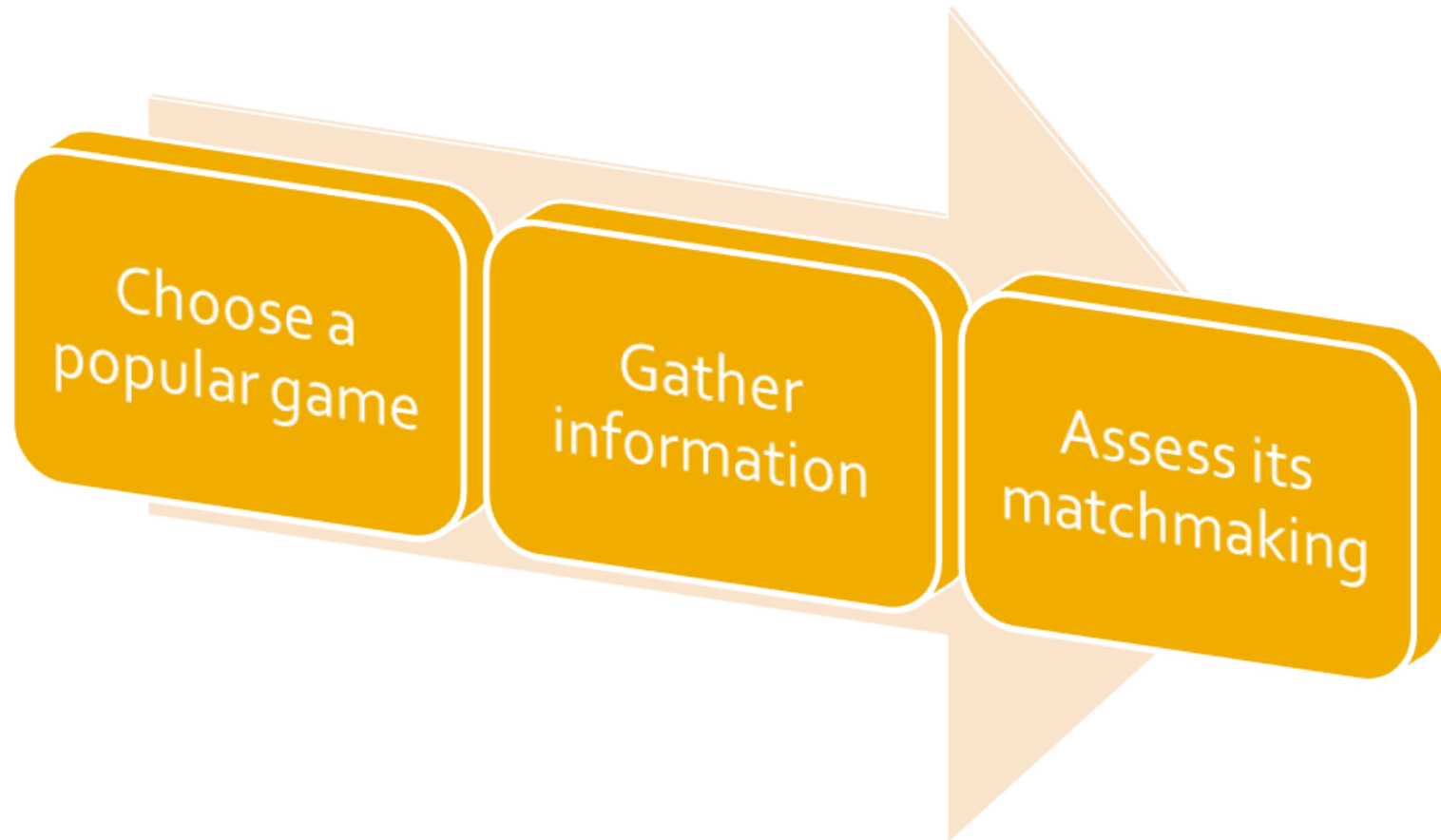
Université Pierre et Marie Curie, France, LIP6.

For NOSSDAV2014

Studying game traces




- Analyzing matchmaking systems
- A few datasets pertain to gaming
 - J. Kinicki and M. Claypool, "Traffic analysis of avatars in second life," in Proceedings of the 18th International Workshop on Network and Operating Systems Support for Digital Audio and Video, ser. NOSSDAV '08.
 - S. A. Tan, W. Lau, and A. Loh, "Networked game mobility model for first-person-shooter games," in Proceedings of 4th ACM SIGCOMM workshop on Network and system support for games
 - ...
- None of them address matchmaking
- Improve future gaming solutions

Studying game traces

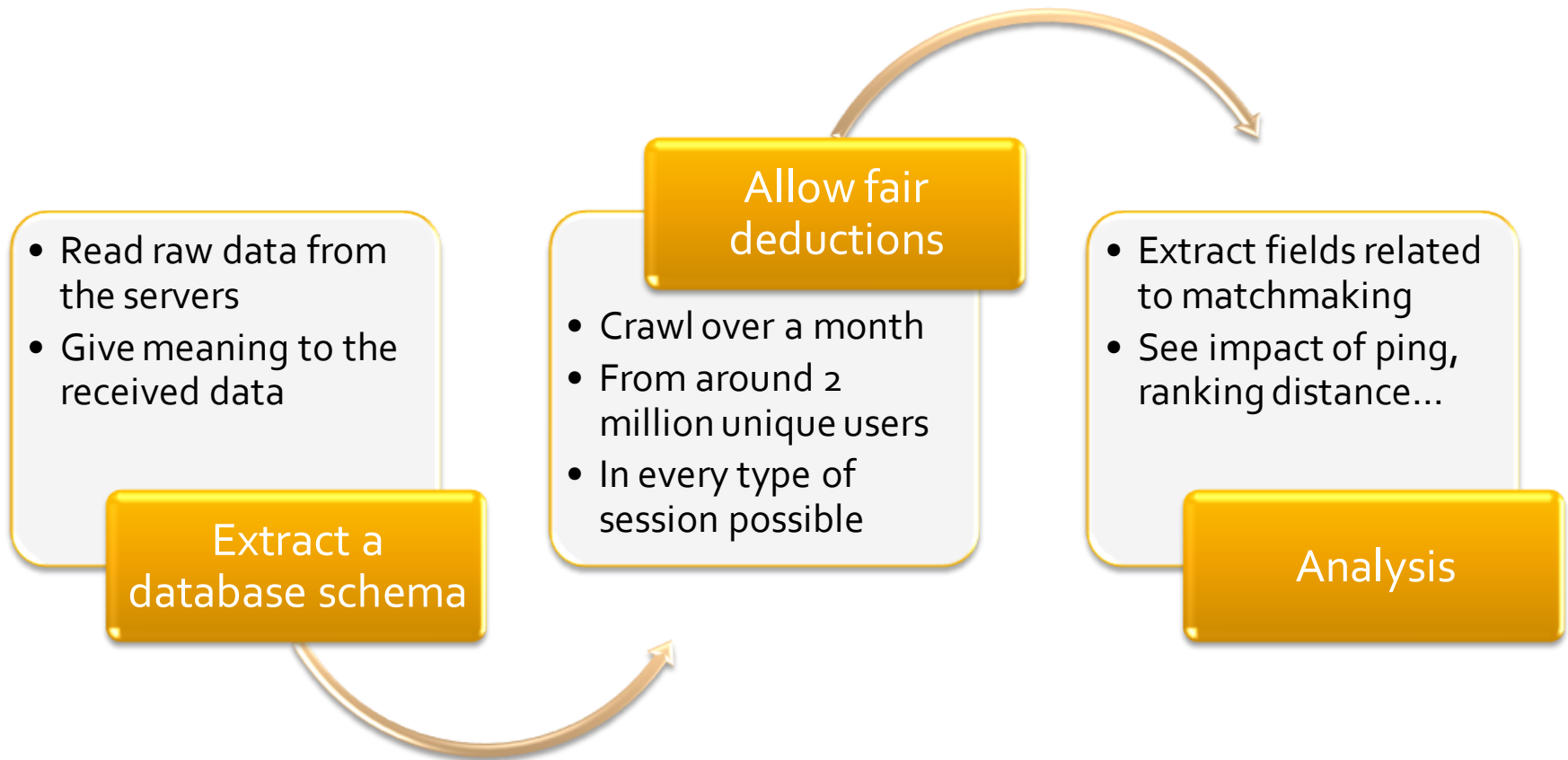


Why League of Legends



- League of Legends has one of the largest playerbases nowadays 
- Allows access to public data about players and game sessions 
- Integrates a matchmaking system 

The crawling process



Data classification

Matchmaking fields

- timeInQueue
- queueType
- premadeTeam
- rating
- ...

Company handlers

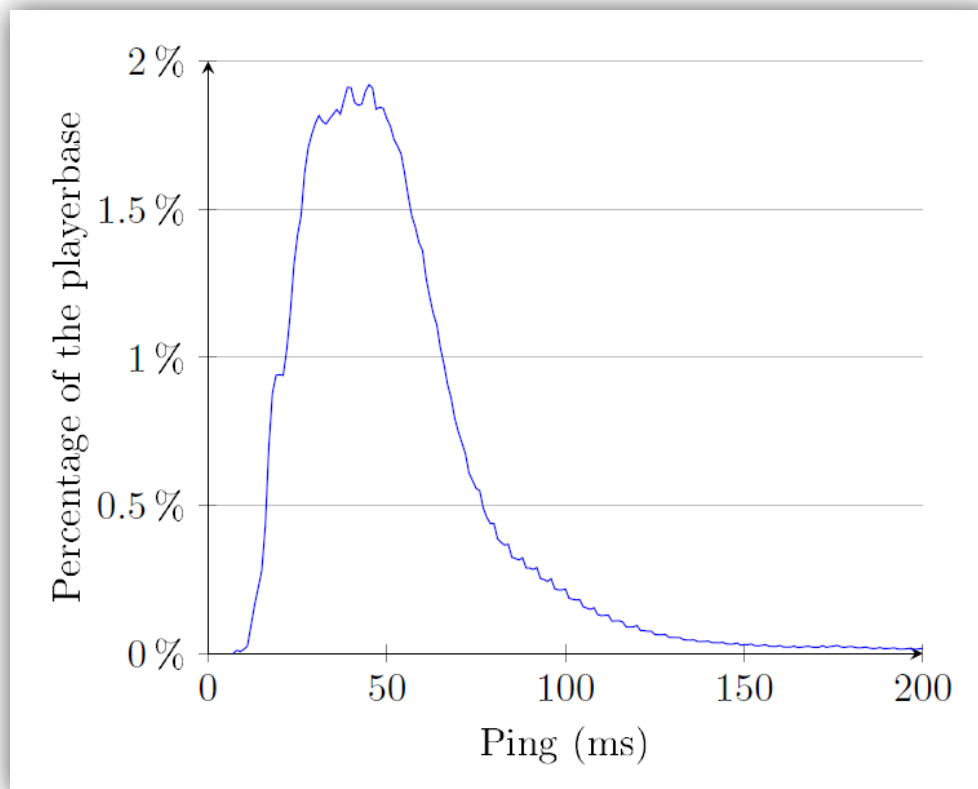
- skin
- ipEarned
- boostIpEarned
- summonerId
- ...

Avatar information

- item0..5
- spell1
- num_death
- gold_earned
- ...

Well connected players

A huge majority of gamers rely on Broadband connections.



Gaming companies can now count on an average ping from users below 60 ms

From ping to performance

- « Introducing » the KDA (kill death assists) ratio:

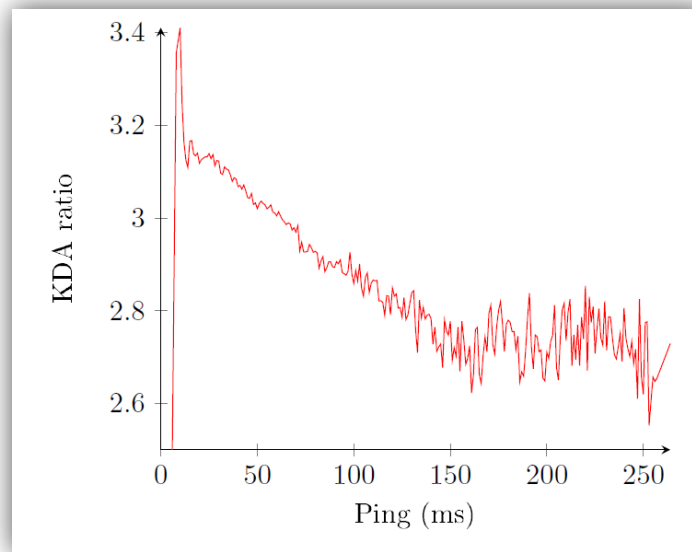
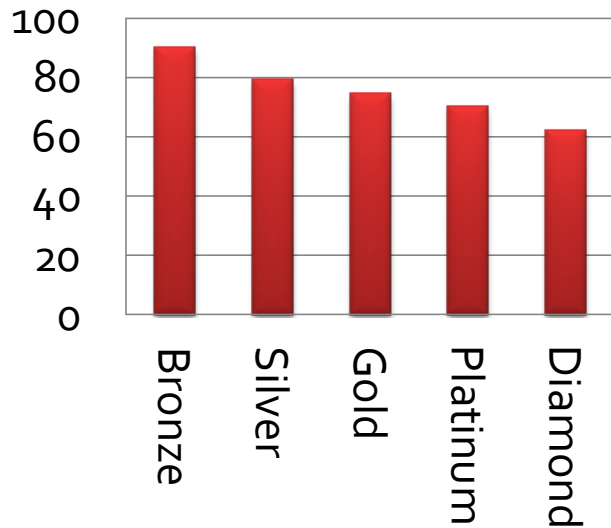
$$kda = \frac{assists + kills}{\max(deaths, 1)}$$

This value reflects individual performance during **one** game

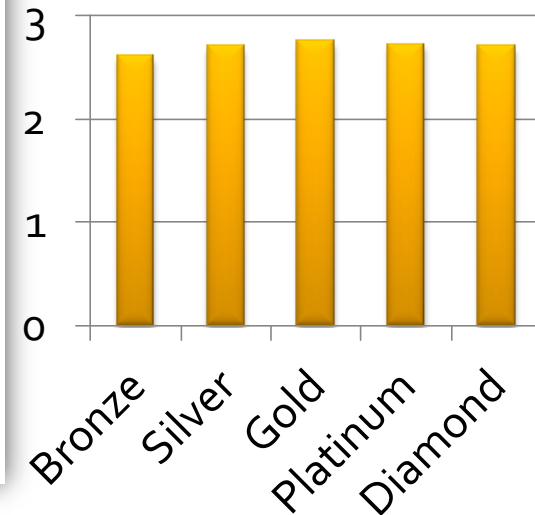
It cannot measure team efforts though

Ping impedes on performance

Average Ping



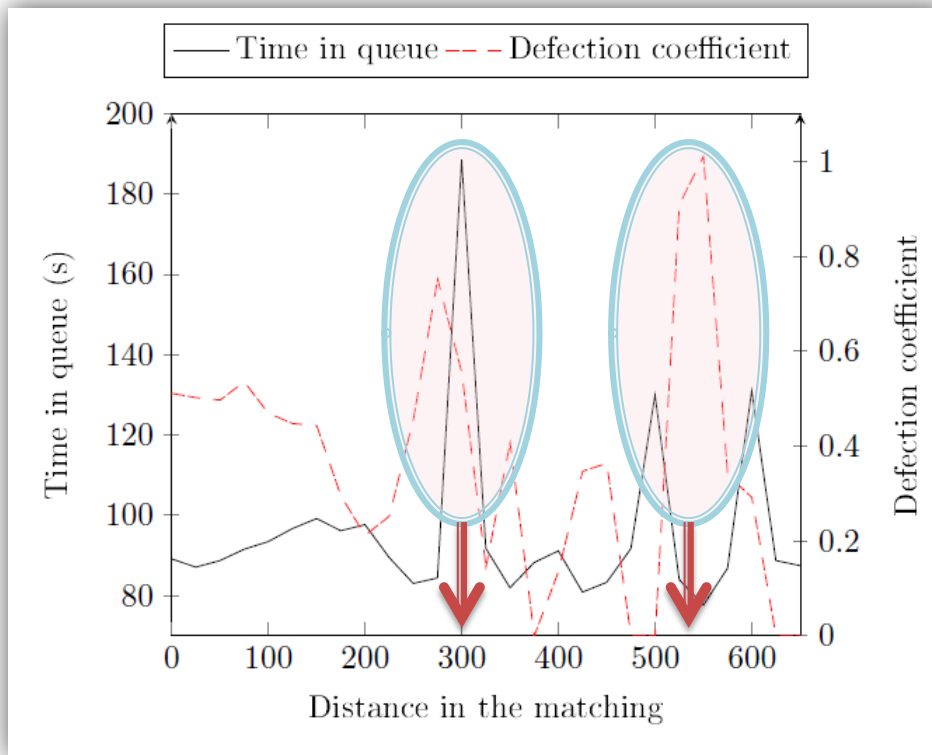
Average KDA



The downwards slope could lead to three potential conclusions :

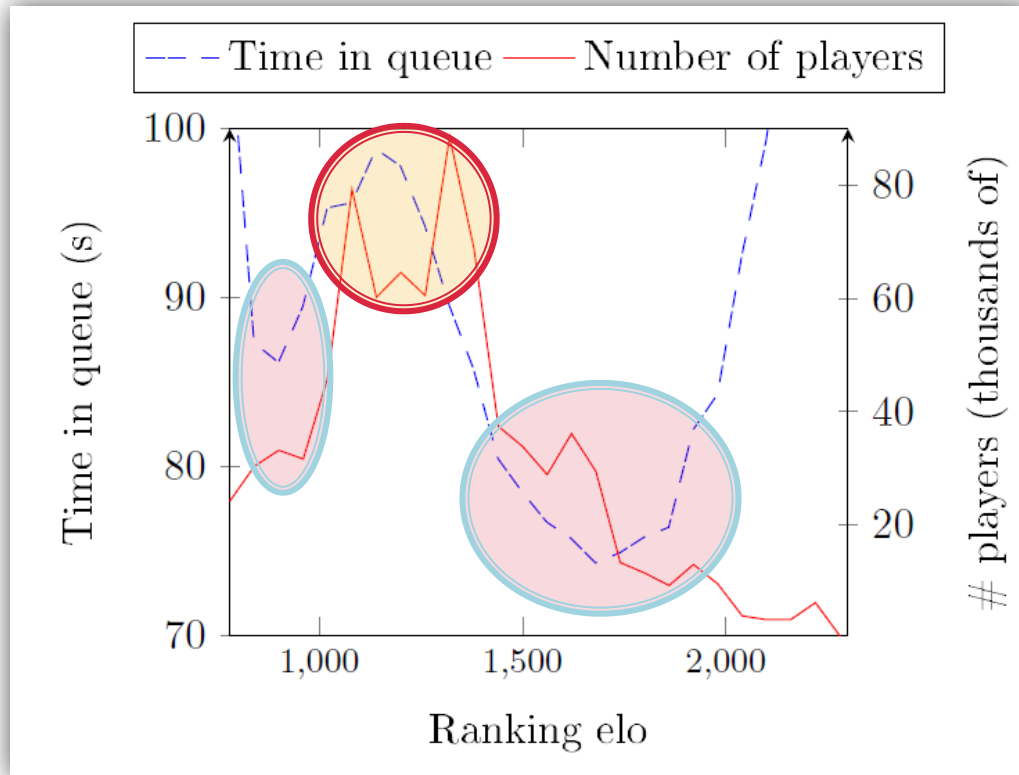
- Players who have a better connection are « better » players
- Ping does impede on player performance ✓
- Better ranked players tend to invest more money in their internet connection

Matching: the faster the better?



The service avoids matching people from different leagues.
It is crucial as we observe more leavers in those games

LoL matchmaking does not scale



We found out that the service really underperforms when there are a lot of available players to match

This is a potential design flaw/scalability issue

Free to study

- Our database is freely available online at :
 - <http://pagesperso-systeme.lip6.fr/maxime.veron/examples.html>
- The code of our crawler is also available
- You can contact me for more information

Complete fields of database

text skinName	double physical_damage_dealt_to_champions	double id
bool isRanked	double magic_damage_dealt_to_champions	double boostXpEarned
int skinIndex	double magic_damage_taken	double levelSummoner
text gameType	double item4	bool invalid
double experienceEarned	double level	int dataVersion
text rawStatsJson	double item1	double userId
bool eligibleFirstWinOfDay	double item2	date createDate
text difficulty	double item0	int userServerPing
int gameMapId	double item5	int adjustedRating
bool leaver	double gold_earned	int premadeSize
double spell1	double physical_damage_taken	double boostIpEarned
double spell2	double total_time_spent_dead	double gameId
text gameTypeEnum	double largest_multi_kill	int timeInQueue
double teamId	double largest_critical_strike	double ipEarned
bool afk	double total_damage_taken	int eloChange
double num_death	double total_heal	text futureData
double physical_damage_dealt_player	double magic_damage_dealt_player	text gameMode
double total_damage_dealt	double true_damage_dealt_player	text difficultyString
double neutral_minions_killed	double turrets_killed	double KCoefficient
double item3	double barracks_killed	int teamRating
double largest_killing_spree	double champions_killed	text subType
double lose	double win	text queueType
double minions_killed	double sight_wards_bought_in_game	bool premadeTeam
double assists	double vision_wards_bought_in_game	double predictedWinPct
double total_damage_dealt_champions	double summonerId	double rating
		double championId

Conclusion

- We provide a freely available database of gaming information
- We show that crawling public data from games should be systematic
- Crawling public information helps identify design flaws, and hence improve gaming architectures