Aalto University
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Win probability estimation for strategic decision-making in esports

Master's Thesis Presentation

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Contents

Background

Esports = the competitive practice of video games

- Growing in popularity for the past decade. [1]
- Major events can reach >100 million viewers. [2]
- Popular titles:
  - **League of Legends**
  - Counter-Strike
  - Valorant
  - Fortnite
  - Dota 2

Esports analytics as an emerging field

"The use of esports-related **data** to assist with **decision-making** processes arising both in-game and outside of it." [3]
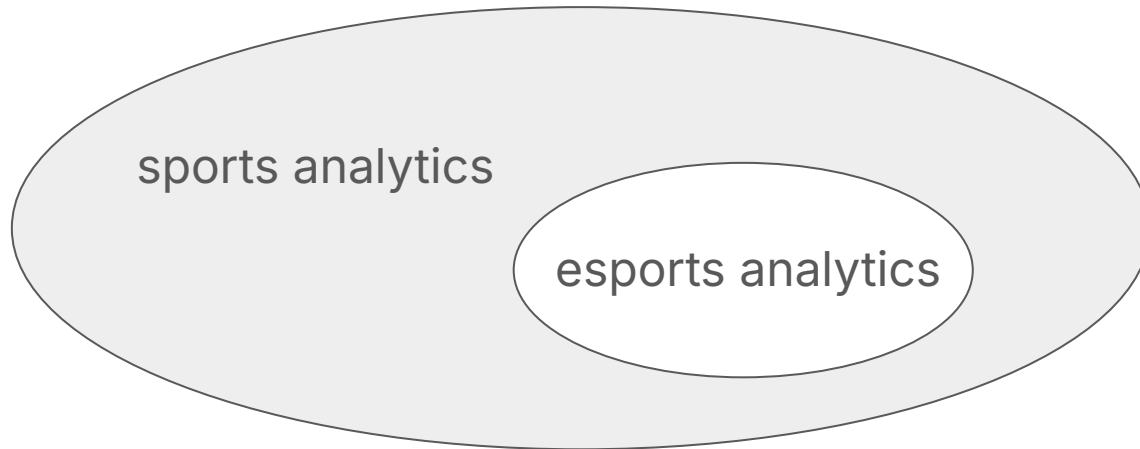
Win probability estimation in sports

"What is the probability that team A beats team B in this situation?"

- Central idea emanating from baseball analytics in the 1960s. [4]
- Common applications:
  - Player performance evaluation and prediction
  - Supporting managerial decision-making
  - **Strategy optimization**
  - Sports betting

Win probability estimation in esports

- Win probability models have been developed for popular games.
- Two commonly used model performance evaluation criteria:

Criterion	Description
Accuracy	Proportion of correctly predicted outcomes.
Expected Calibration Error (ECE)	Average difference between estimated win probability and true proportion of wins.

- Applications are still lacking, especially **strategy optimization**.

Case study

Contextualized win probability statistics: ΔW and W

Win probability added ΔW
Initial win probability W

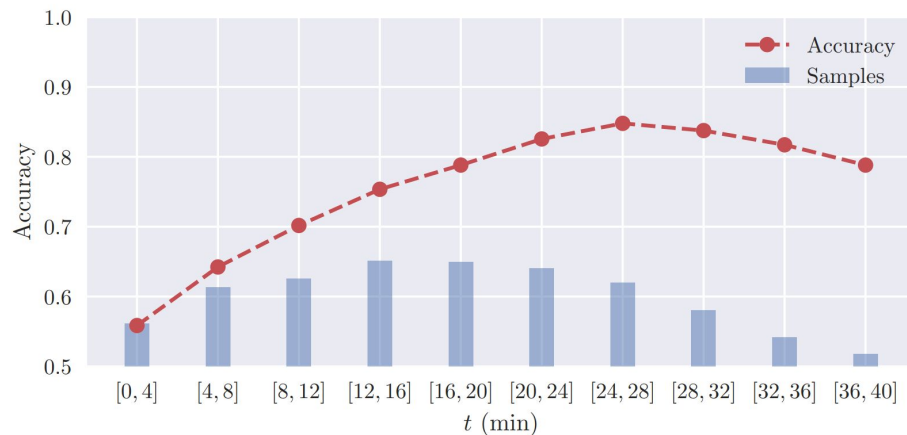ΔW = "What was the impact
of purchasing the item?"

W = "In what situation was
the item purchased?"

Deep neural network win probability model for LoL

- Training set 350 000 LoL matches, testing set 50 000 matches.
- Calibration is crucial for providing reliable win probabilities!

Model	Accuracy [%]	ECE [%]
Baseline [5]	73.0	4.47
Fine-tuned [5]	73.8	0.57
Our model	75.9	0.90

References

[1] D. Tang et al. "What is esports? A systematic scoping review and concept analysis of esports". Heliyon 9.12 (2023), article e23248.

[2] Riot Games. "League of Legends Esports Breaks World Championship Viewership Record". League of Legends Esports Media (2021).

[3] M. Schubert, A. Drachen, and T. Mahlmann. "Esports analytics through encounter detection". Proceedings of the 10th MIT Sloan Sports Analytics Conference (2016).

[4] G. R. Lindsey. "The progress of the score during a baseball game". Journal of the American Statistical Association 56.295 (1961), pp. 703–728.

[5] D.-H. Kim, C. Lee, and K.-S. Chung. "A confidence-calibrated MOBA game winner predictor". 2020 IEEE Conference on Games. IEEE, 2020, pp. 622–625.