

Predicting Win Probabilities in SSB Melee

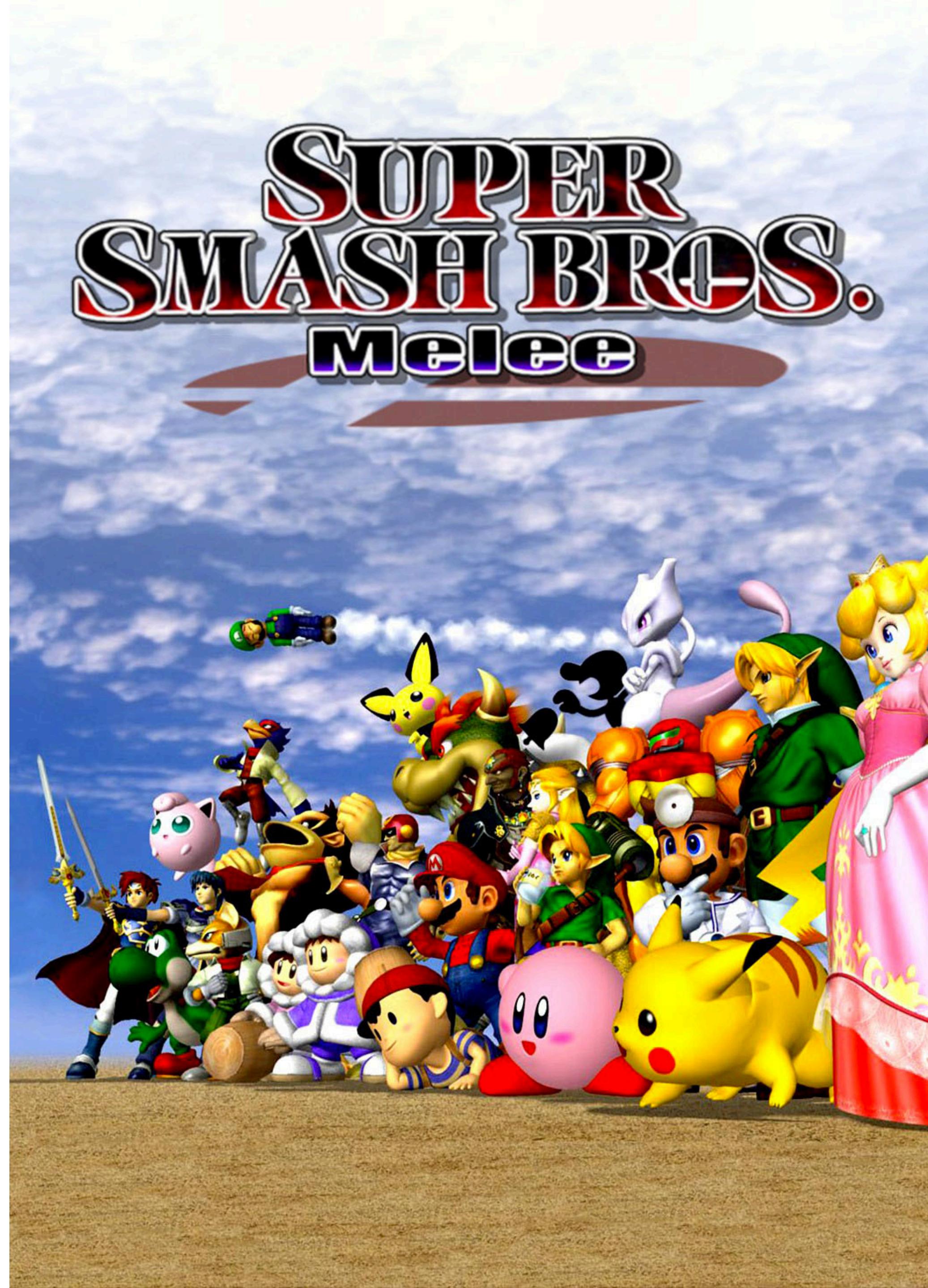
Nathaniel Speiser

Super Smash Bros. Melee

- 2001 Nintendo fighting game
- Dedicated community of hardcore fans
- Active competitive scene regularly draws >10,000 viewers



Melee tournament at Mandalay Bay Events Center





C9 Mango

Lower Quarterfinals
Singles

2 2

PG Plup

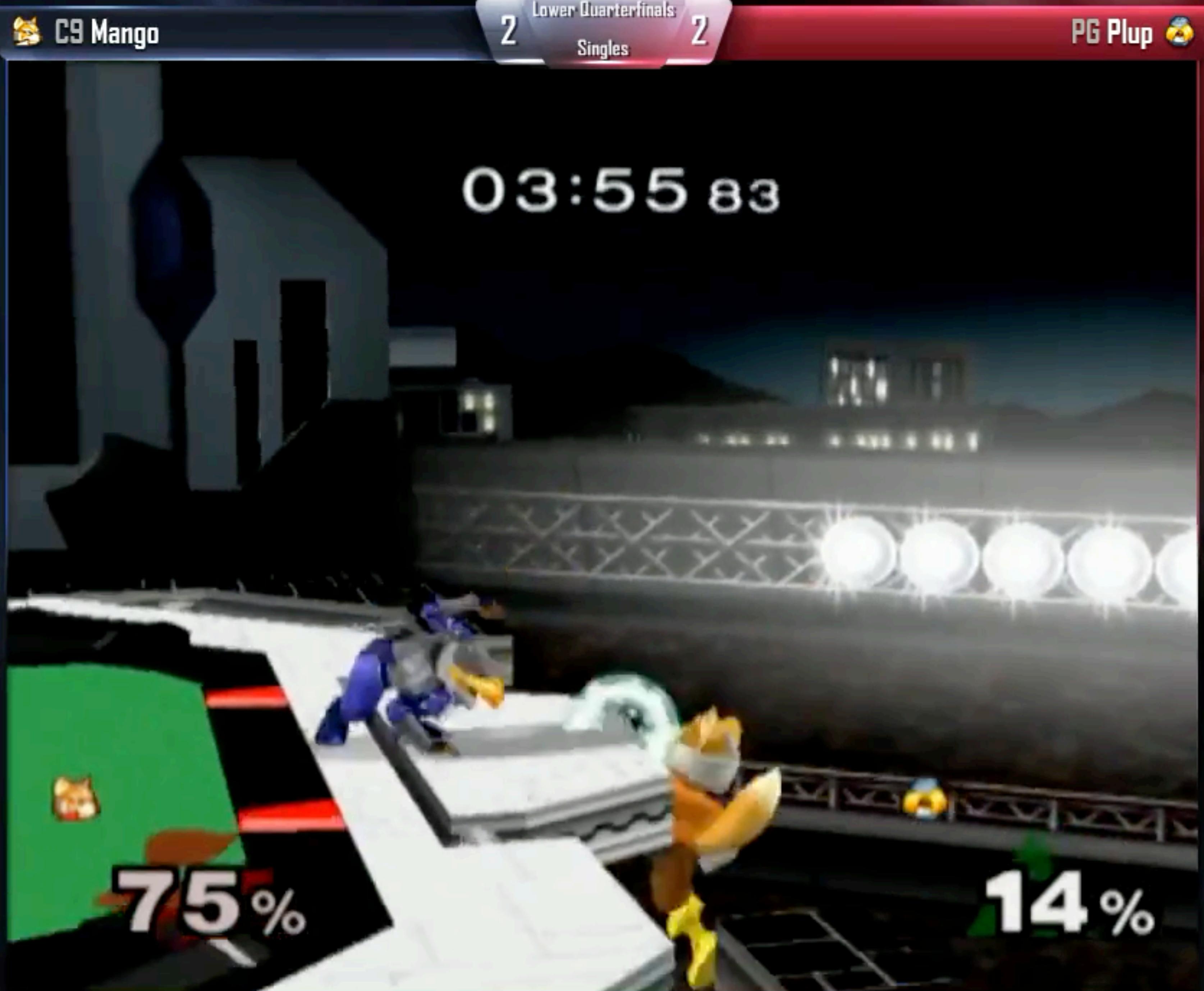
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twitch

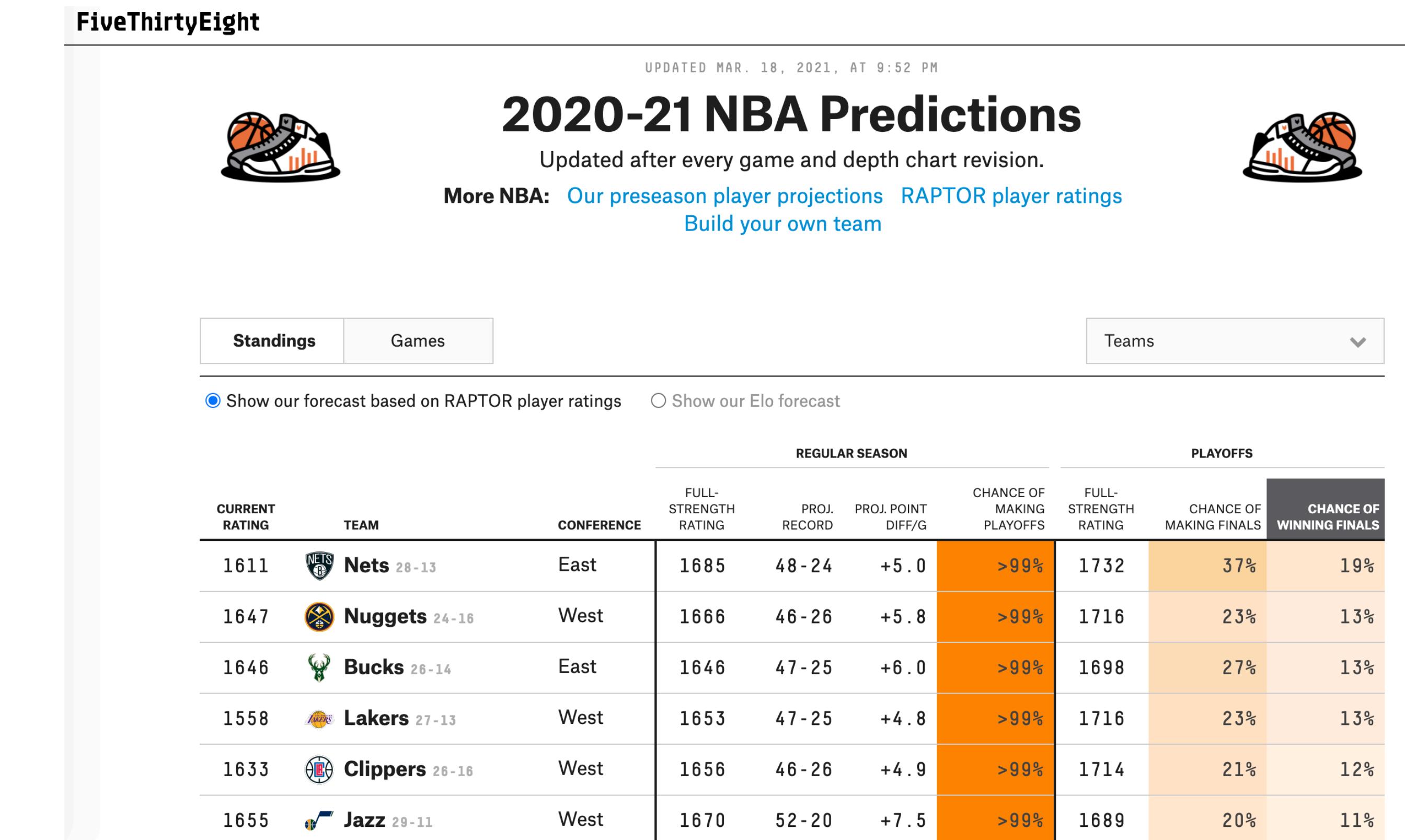
smash.gg

 BRAINGEAR.
Brain performance formula



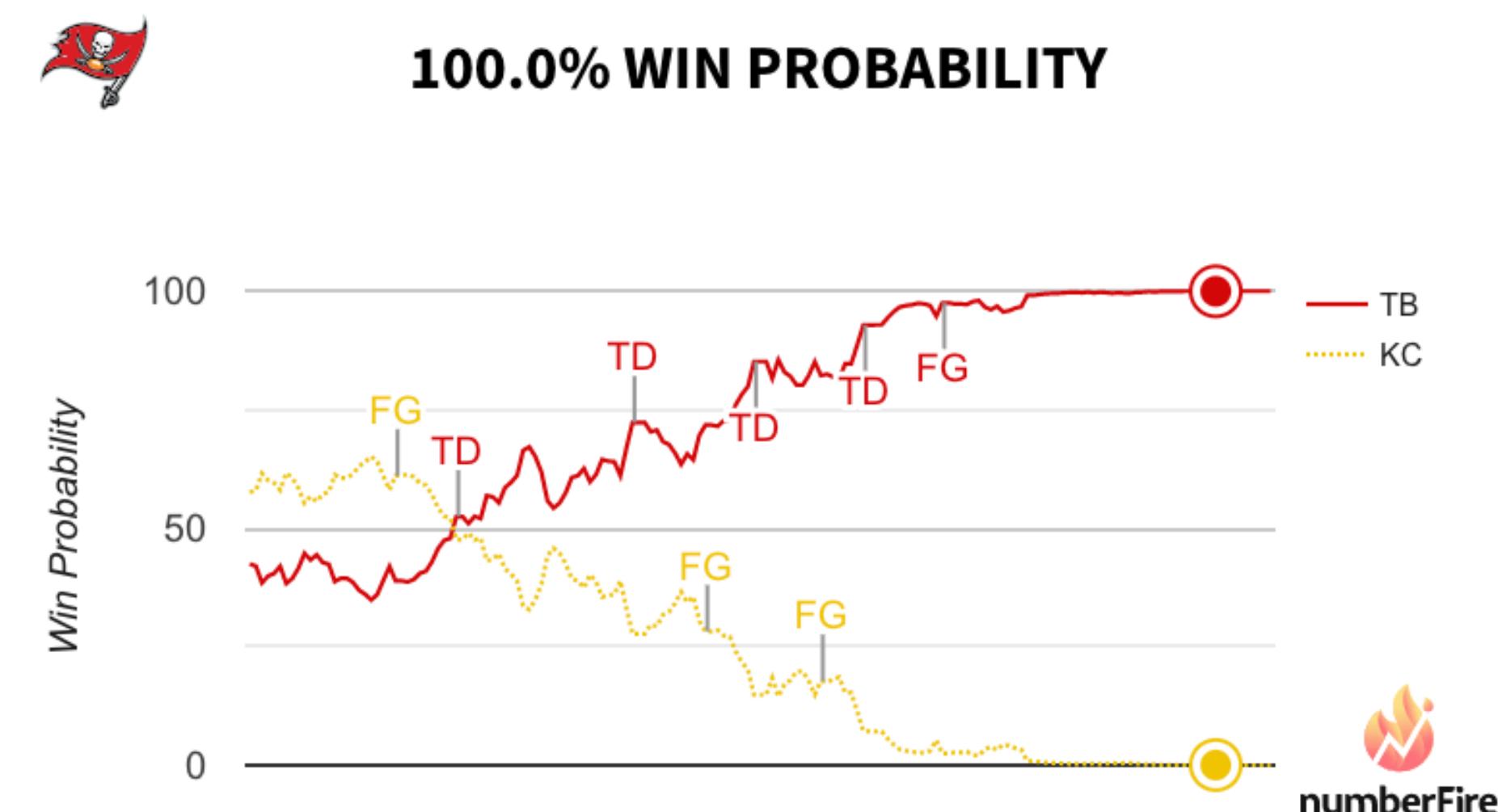
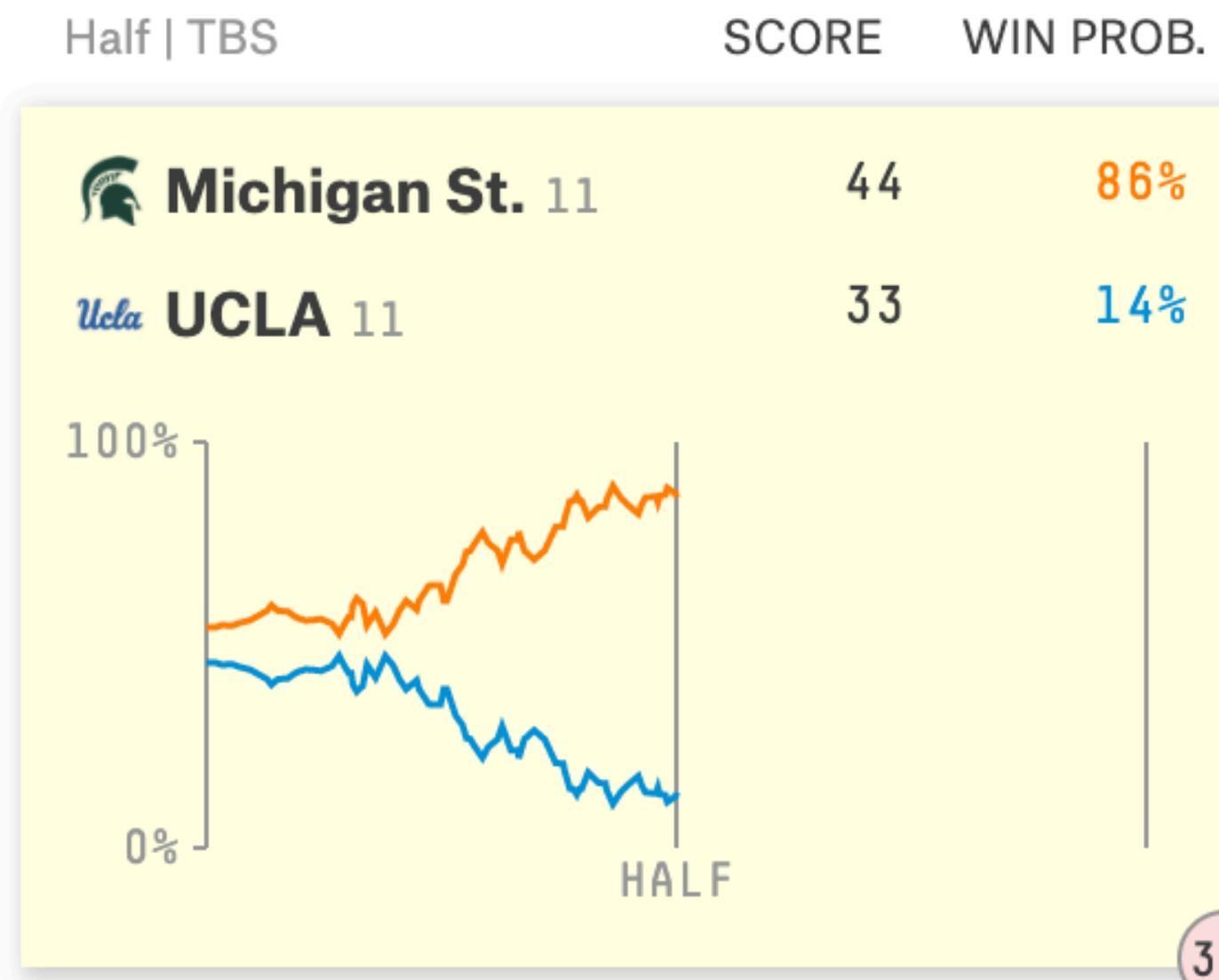
Where's the esports data journalism?

- Success of websites like FiveThirtyEight show appetite for sports data journalism
- Esports can be studied just as much, if not more, than conventional sports



Goal: predict in game win probabilities

- In game win probabilities a common type of sports data journalism
- Can be used to tell interesting stories, keep audience engaged outside of games themselves



Data description

- 18,000 games from 5 tournaments, parsed with community written tools
- Sampled each game every 5 seconds (>600,000 rows of data)
- Features:
 - Basic: time, stocks (lives), damage
 - One Hot Encoded characters, stage
 - Advanced in-game stats: Number of hits for each attack type, time since last stock lost, etc.



Model selection and evaluation

XGBoost



TensorFlow

Model selection and evaluation

XGBoost



TensorFlow

Sklearn extremely randomized trees classifier produces best probability graphs



Final model performance

0.25

Average Log Loss

Final model performance

0.25 0.93

Average Log Loss

Accuracy

Final model performance

0.25

Average Log Loss

0.93

Accuracy

0.98

ROC AUC

Most predictive features

Stock-based features

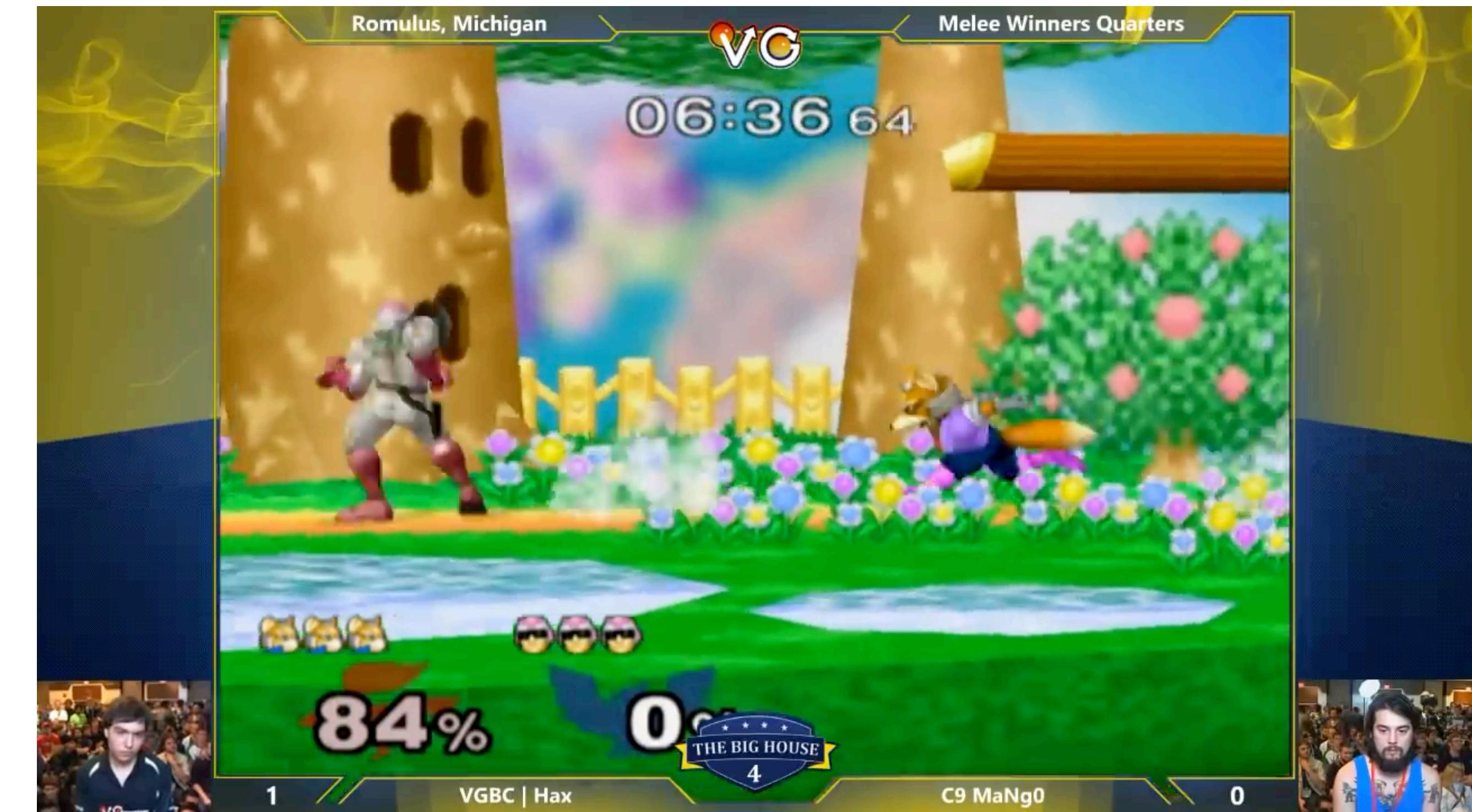


Most predictive features

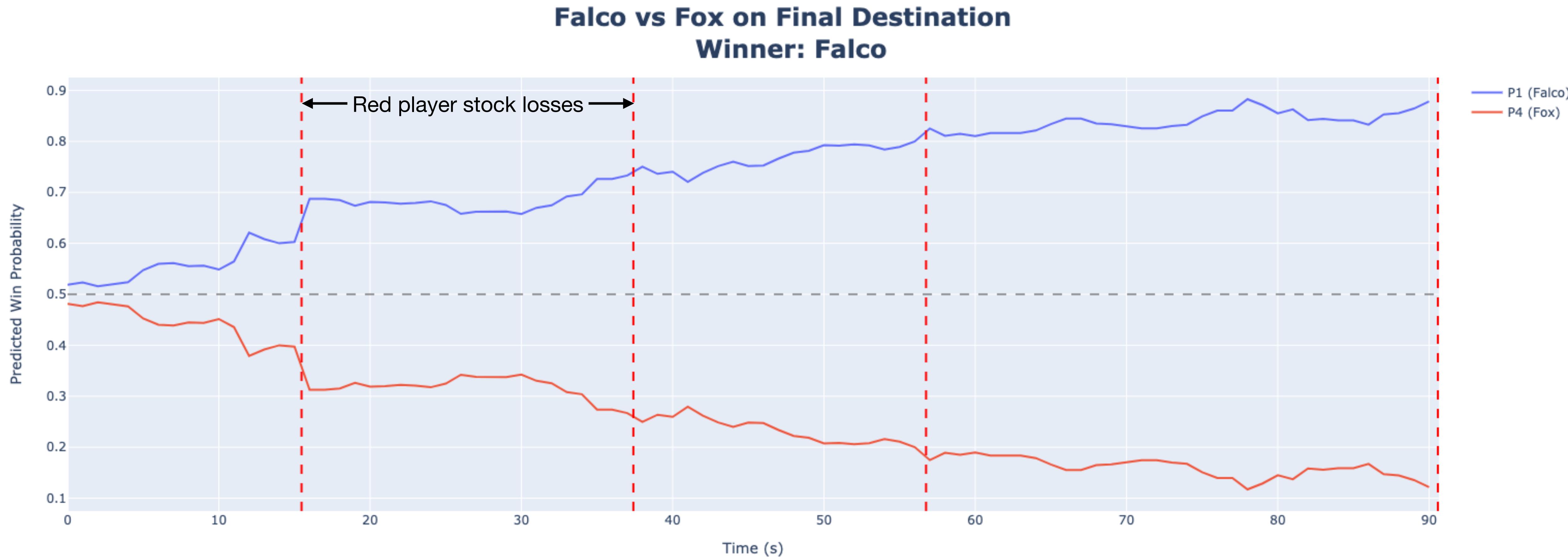
Stock-based features



Hit-based features



In game probability graphs



In game probability graphs, cont.



Graph captures comeback even though always losing in stocks and damage

Streamlit app

≡

Melee win probability predictor

Choose a .slp file

Drag and drop file here
Limit 200MB per file

Browse files

comeback.slp 2.3MB

X

Show stock losses on graph



Game Stats:

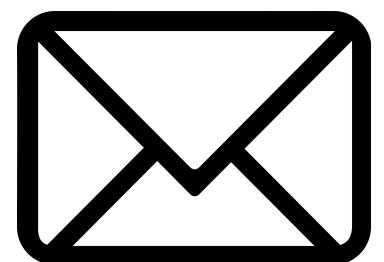
Winner: P1 (Marth)



Conclusions and future directions

- Techniques that are applied to conventional sports can also be applied to esports with high degree of success
- Field is open for more complex models on more complex games, especially games with developer support
- Future models could incorporate player data, not just game states, and be updated live

Thank you!



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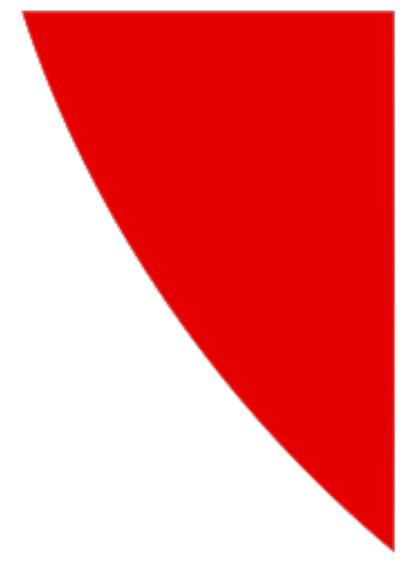
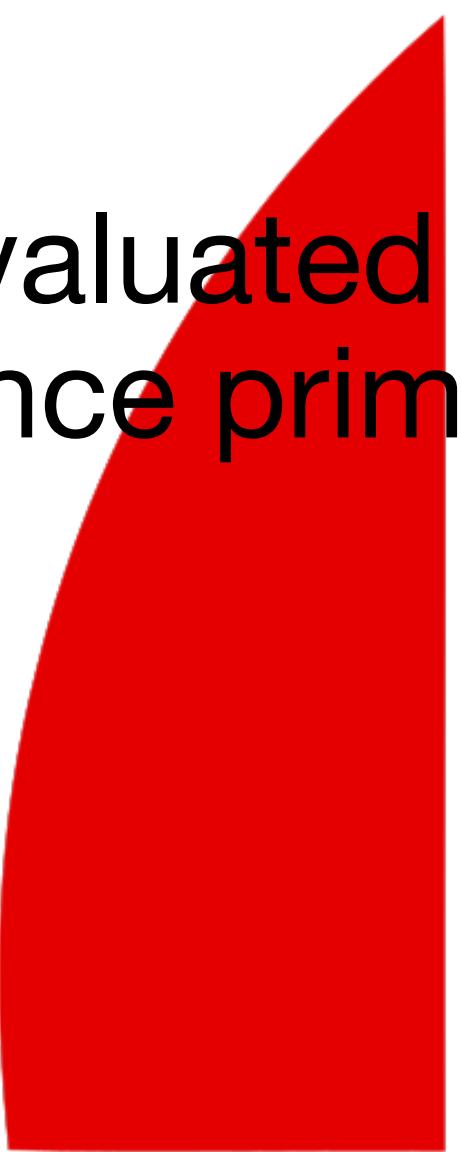
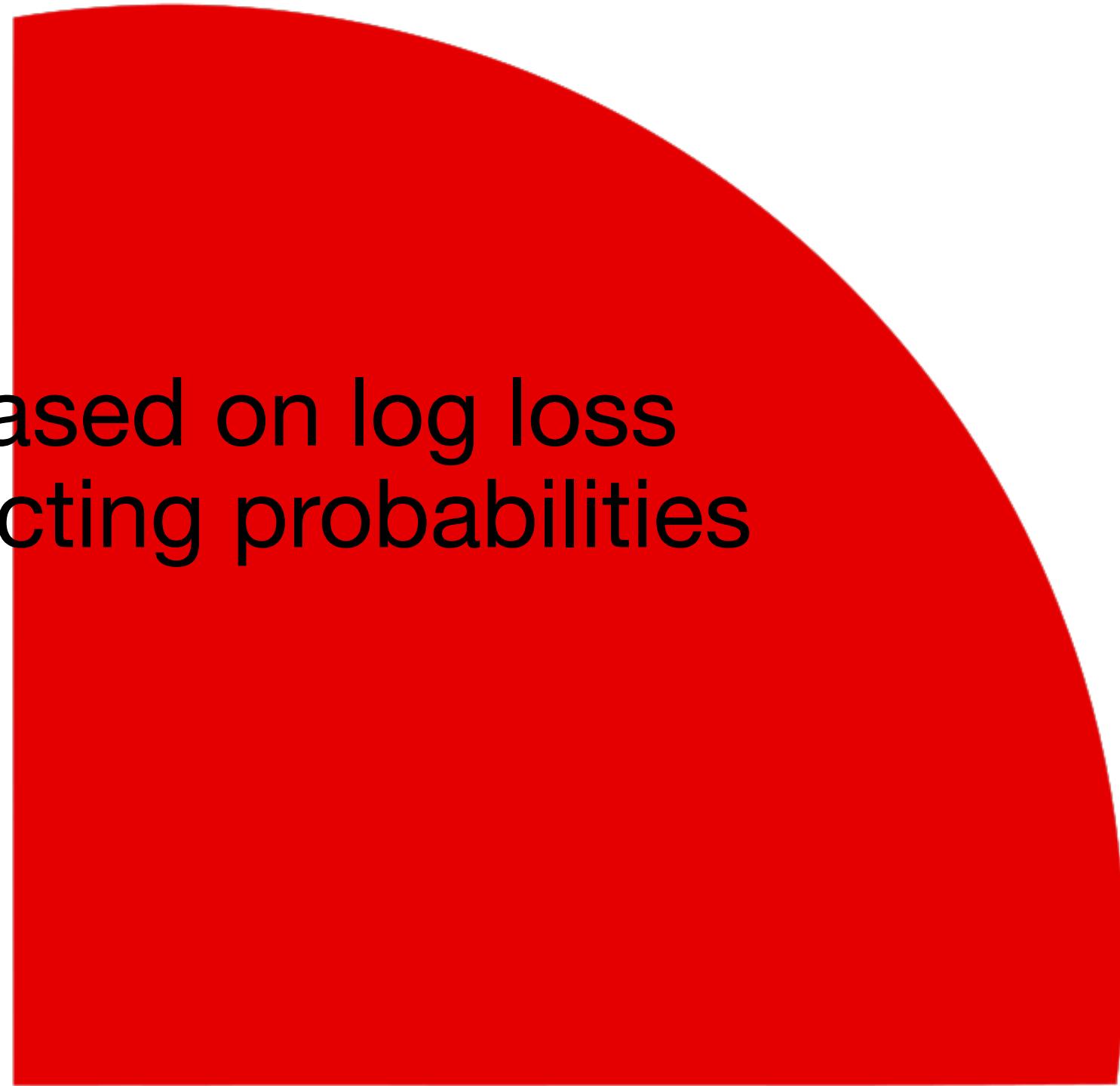


bit.ly/3cT2vj3

Data acquisition

- Community written tools allow for recording and parsing of games
- Training and test data are games from 5 tournaments, sourced from community Discord





Evaluated models based on log loss
since primarily predicting probabilities