



# Sports Match Outcome Prediction with Spatio-Temporal Graph Representation Learning

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## Problem Definition

Input Data:

1. A sequence of match outcomes (win, lose, draw)
2. Lineup roster information for each match

Output: Pre-game outcome predictions

## Dynamic Graph Model

Method: Dynamic graph representation learning, not sport-specific.

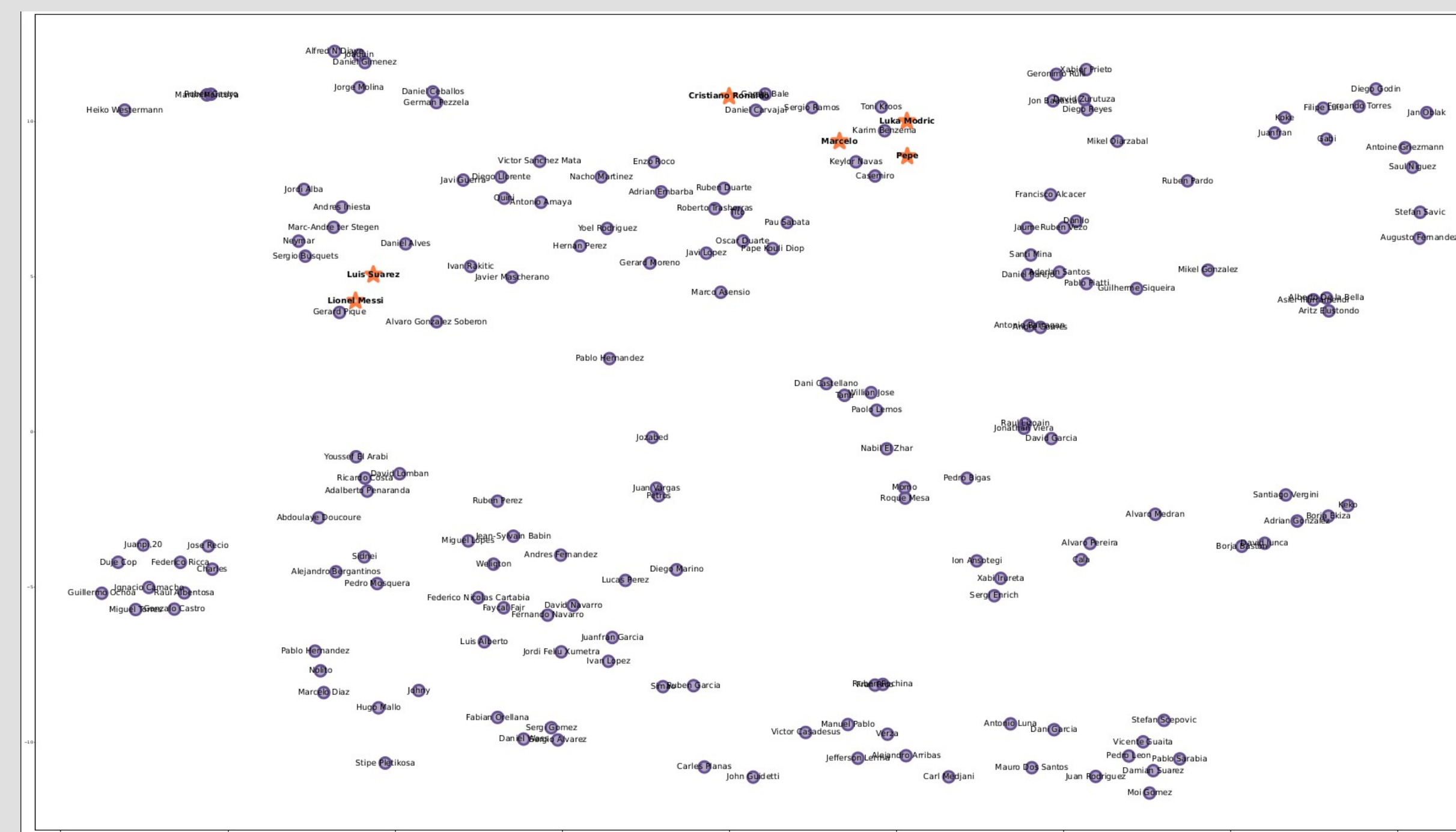
- Players and Teams are Nodes
- Match results are recorded on edges
- Having both team and player nodes means that *team strength emerges from player interactions*.
- Different nodes for different times capture *strength dynamics*.

## Graph Representation Learning Method

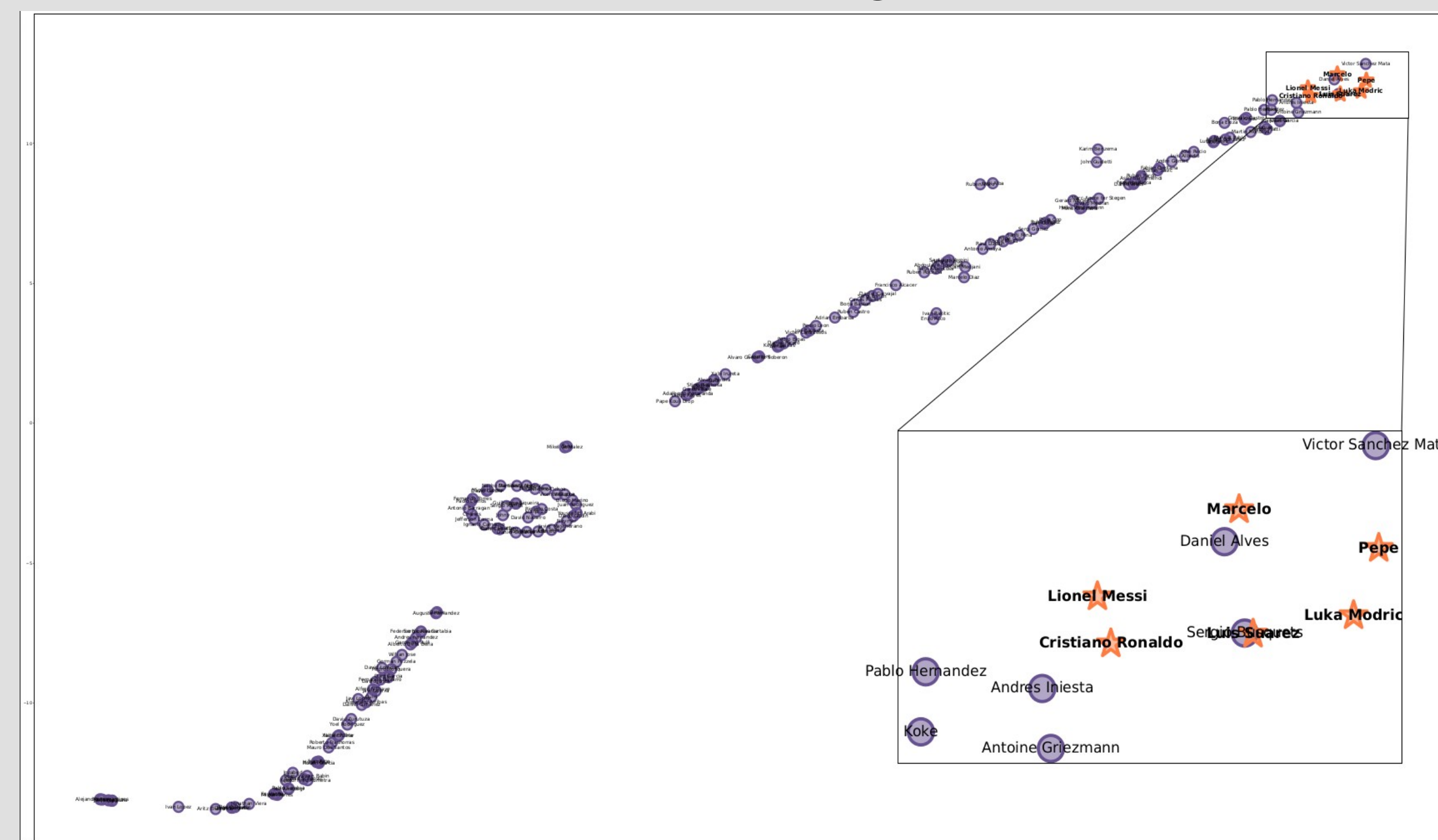
- A graph neural network computes a representation (d-dimensional latent vector) for each player and team.
- A GNN uses **message passing**: iteratively updates each node representation given the representations of the neighbours.
- Team representations t1 and t2 are given as input to a feedforward neural network that predicts the outcome of the match between t1 and t2.

## Learned representation

Before Training

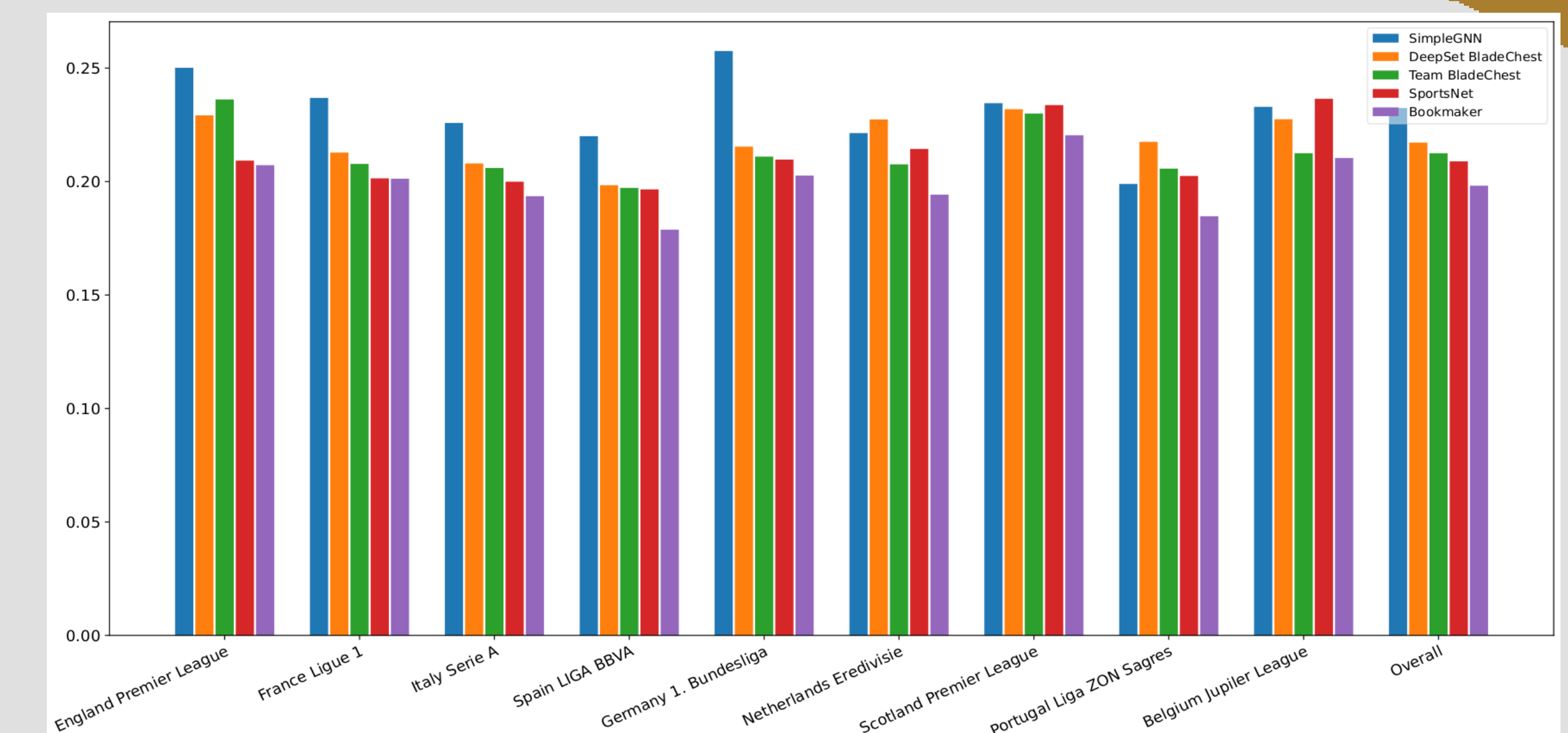


After Training

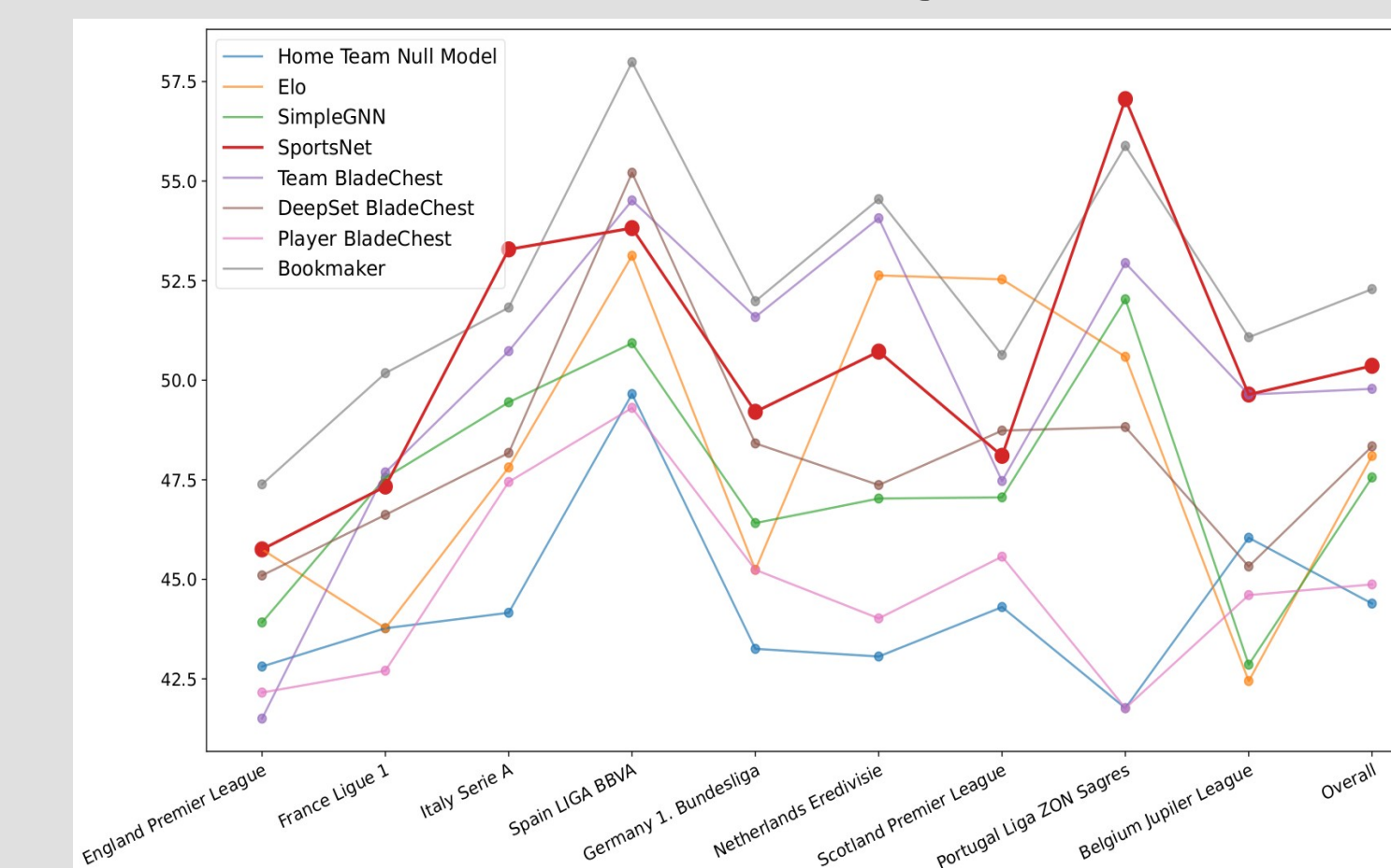


## Results

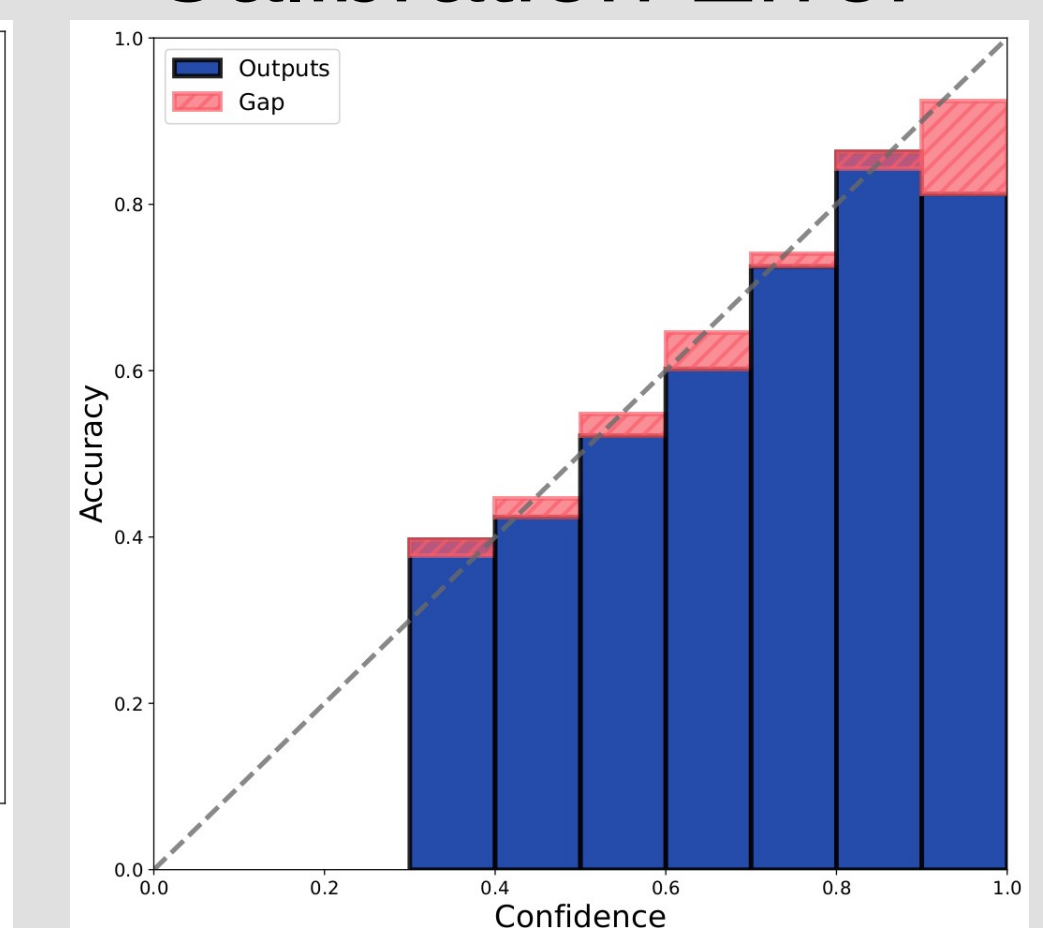
Ranked Probability Score



Accuracy



Calibration Error



## Conclusion

- Minimal feature engineering required
- Built in mechanism for capturing player evolution in time
- Graph structure ideal for adding extra information

## References

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