

Applying supervised machine learning to predict optimal playing positions for netball players



Rasool MY¹, Stander A¹, du Toit PJ¹, Nortje E¹, Kleynhans M¹

1. Department of Physiology, Faculty of Health Sciences, University of Pretoria



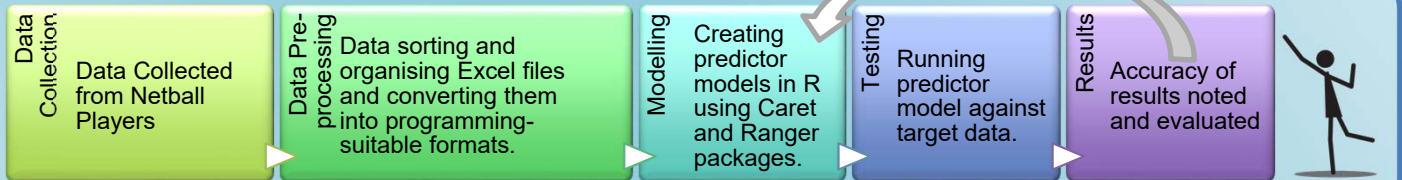
Introduction

Machine learning is an application of artificial intelligence (AI). Supervised machine learning algorithms can use what has been learned in the past and apply it to new data, using labelled examples to accurately predict future events. This AI also uses both input and output data to develop its models. The focus of this project was prediction, so supervised learning was used to meet the project objectives. Consistent activity in a position that is incorrect may put netball players at risk of injury and reduce their performance in their team.



Aim: To predict correct playing positions for netball players by applying supervised machine learning techniques.

Materials and methods



This project used retrospective data of netball players. The data received from the netball players were in two batches; a set of physiological variables and netball-specific training results which were named the “In-body Data”, and a set of neuro-psychological and neuro-physiological variables recorded from other netball players, which were then named the “Neuro Data”. These variables then served as parameters for the model to train on. For this project, the standard seven netball positions were divided into 3 groups, namely position 1 (Goal-Keeper, Goal Defence and Wing Defence), position 2 (Centre, Wing Attack) and position 3 (Goal Attack, Goal Shooter) .

Results of “Neuro” Data

Model nr	All Parameters	Top 20 Parameters
1	40%	40%
2	20%	40%
3	20%	40%
4	0%	20%
5	40%	40%
6	20%	40%
7	0%	20%
8	40%	40%
9	20%	20%
10	20%	40%
Average	22%	34%

Table 1, Accuracies of each model run and the average accuracy after 10 runs, of all 106 parameters as well as the top twenty parameters of the neuro-link data set.



Table 2, Accuracies of each model run and the average accuracy after 10 runs, of all fifty-nine parameters as well as the top twenty parameters of the In-body data set.

The accuracy in these 2 tables means that this model can accurately predict the position a random player should play in “x”% of the time.

Results of “In-body” Data

Model nr	All Parameters	Top 20 Parameters
1	50%	50%
2	50%	100%
3	25%	50%
4	50%	75%
5	50%	75%
6	50%	100%
7	50%	75%
8	50%	25%
9	75%	75%
10	100%	75%
Average	55%	70%

Discussion and Conclusion

This preliminary model was 70% effective when using in-body physiological parameters and 34% effective when using neuro-psychological and neuro-physiological parameters. It can be improved with additional data in future. The in-body data made for more accurate predictions, likely because the physiological parameters tested were more relevant to netball and included netball specific training-drill results. This project will bridge research gaps, begin new research in this field and form part of a larger future project to develop data analyses and Machine learning methods to predict player performance.

