# 6 Evaluation

## Strength

* 传球评价指标PEI的设计和传球网络模型PNM建立紧密相关。PEI综合考虑了每一次传球的多个方面，量化了传球的好坏程度，能缩小与实际情况误差和方差；传球网络模型以图论作为基础，直观描述配合默契程度，有助于多元组合的搜索，并且可视化的效果能突出默契组合。
* The establishment of PNM is closely related to the design of PEI. PEI comprehensively considers many aspects of each pass, quantifies the quality of the pass, and can reduce the error and variance with the actual situation. And the network model of pass, based on graph theory, intuitively describes the degree of cooperation, which is conducive to the search of multiple combinations, and the visual effect can highlight the familiar combination.
* 热力图生成模型对于离散型数据的近似连续化有很强的兼容性，能够应对坐标数据过少或稀疏的情况，基于可视化的数据分析球员站位与实际情况相符；对于events数据的清洗有效规避了数据异常和缺失所带来的影响，建立随机森林分类器模型在比赛样本数量仅为38的情况下不容易过拟合或偏差过大，参数调优后最高达到80%的准确率足以对比赛大致结果进行有效预测，what means该模型可以基于近期数据为未来比赛做出预测并且给教练的训练和line-up作为参考。
* Heatmap generation model has strong compatibility for the approximate continuity of discrete data, and can cope with the situation of too little or sparse coordinate data. Based on the visual data analysis, player position is consistent with the actual situation. In addition, for the cleaning of events data, the impact of data abnormality and missing is effectively avoided. Even though the number of samples is only Under 38, it is not easy to overfit or deviate too much. The highest accuracy of 80% after parameter optimization is enough to effectively predict the general results of the game, what means this model can make predictions for the future game, that reflects the current ability of the team, based on the recent data and give training and line up to coaches as reference.
* 将教练的静态结构策略转化为最优排列组合问题；大规模数据支持了评价指标的维度增加，降低了评价球员位置能力值偏差的期望；模拟退火算法在算力有限的情况下，依据实际经验设置启发策略，运用无法精准的个人能力评价指标来寻得11人球员排列组合的局部最优解，在准确度期望一定的情况下，可以在阈值范围内接受它为全局最优解。
* The static structure strategy, which should be developed by the coach, is transformed into the optimal arrangement and combination problem of 11 elements. Large-scale data supports the increase of the dimension of the evaluation index and reduces the expectation of the deviation of the particular position ability value of each player. Under the condition of limited computing power, the simulated annealing algorithm is properly used, and we manually set the starting strategy according to the actual experience and uses the imprecise individual ability evaluation index to find the arrangement and combination of 11 players. The partial optimal solution can be accepted as the global optimal solution within the threshold range when the accuracy expectation is certain.
* 上述的模型能够很容易地对应到group dynamics中的理论关键点，基于已有影响因素的额外方面也具有很大实际意义。
* The models can easily correspond to the theoretical key points in group dynamics, and the additional aspects based on the existing influencing factors are also of great practical significance.

## Weakness

* 在模型中超参数较多，模型的参数调优有着极大的挑战。
* 每个时刻有数据的球员较少，对球员无球能力的考查无法进行，且难以从整体的站位和阵型评价进攻或防守。
* 输入随机森林分类器模型的比赛样本过少，训练结果波动较大。
* 模拟退火算法得出的最佳阵容仅能确保为局部最优解，不能保证为全局最优解。
* There are many hyper parameters in the model, so the parameter optimization of the model has a great challenge.
* There are fewer players with data at each time, so it is impossible to test the players' ability without the ball, and it is difficult to evaluate the attack or defense from the aspect of the overall position and formation.
* There are too few samples to input the RFC model, so the training results fluctuate greatly.
* The optimal lineup obtained by the simulated annealing algorithm can only be guaranteed to be a local optimal solution, not a global optimal solution.