

ABSTRAK

Seiring perkembangan zaman, klasifikasi posisi pemain sepak bola menghadapi keterbatasan terhadap metode tradisional yang rentan bias dan sulit menangani data kompleks. *Machine learning* menawarkan solusi terkait permasalahan tersebut. Penelitian ini membandingkan algoritma *K-Nearest Neighbors* (KNN) dan *Artificial Neural Network* (ANN) untuk mengklasifikasikan posisi pemain berdasarkan atribut fisik dan mental dari data yang disediakan oleh EA Sports FC menggunakan pendekatan *supervised learning*. Dataset diklasifikasikan ke dalam lima posisi pemain outfield yang terdiri dari *Striker*, *Winger*, *Midfielder*, *Wing Back*, dan *Centre Back*. Hasil menunjukkan KNN mencapai *accuracy* tertinggi 86,97% (K=3, manhattan distance, dengan ADASYN), mengungguli ANN yang mencapai 86,81% (3 hidden layer, kombinasi 10-5-15 fungsi aktivasi, tanpa ADASYN). Untuk *precision* tertinggi, ANN mencapai nilai 87,08% (3 hidden layer, kombinasi 10-5-15 fungsi aktivasi, tanpa ADASYN) dan KNN mencapai 86,95% (K=3, manhattan distance, dengan ADASYN). KNN unggul pada nilai *recall* yang mencapai 86,97% (K=3, manhattan distance, dengan ADASYN) dibandingkan dengan ANN yang mencapai 86,81% (3 hidden layer, kombinasi 10-5-15 fungsi aktivasi, tanpa ADASYN). Hasil *f1-score* tertinggi untuk ANN sebesar 86,89% (3 hidden layer, kombinasi 10-5-15 fungsi aktivasi, tanpa ADASYN), sementara KNN bernilai 86,55% (K=3, manhattan distance, dengan ADASYN). Perbedaan signifikan terletak pada efisiensi waktu *runtime* dimana KNN hanya memerlukan 1,21 detik sedangkan ANN membutuhkan 110,86 detik untuk menghasilkan nilai *accuracy* tertinggi. Secara keseluruhan hasil menunjukkan bahwa kedua algoritma menghasilkan kinerja model yang cukup baik, namun KNN lebih baik dalam melakukan klasifikasi dibandingkan ANN. Teknik balancing ADASYN mampu meningkatkan kinerja KNN, namun menurunkan performa ANN.

Kata kunci: Klasifikasi, K-Nearest Neighbors, Artificial Neural Network, Sepak Bola, ADASYN

ABSTRACT

As times change, traditional methods of classifying soccer player positions are becoming increasingly limited due to their susceptibility to bias and difficulty in handling complex data. Machine learning offers a solution to these problems. This study compares the K-Nearest Neighbors (KNN) algorithm and the Artificial Neural Network (ANN) for classifying player positions based on physical and mental attributes from data provided by EA Sports FC using a supervised learning approach. The dataset is classified into five outfield player positions: Striker, Winger, Midfielder, Wing Back, and Centre Back. The results show that KNN achieved the highest accuracy of 86.97% (K=3, Manhattan distance, with ADASYN), outperforming ANN, which achieved 86.81% (3 hidden layers, combination of 10-5-15 activation functions, without ADASYN). For the highest precision, ANN achieved a value of 87.08% (3 hidden layers, combination of 10-5-15 activation functions, without ADASYN) and KNN achieved 86.95% (K=3, Manhattan distance, with ADASYN). KNN outperformed ANN in terms of recall, achieving 86.97% (K=3, Manhattan distance, with ADASYN) compared to ANN's 86.81% (3 hidden layers, combination of 10-5-15 activation functions, without ADASYN). The highest F1-score for ANN was 86.89% (3 hidden layers, combination of 10-5-15 activation functions, without ADASYN), while KNN achieved 86.55% (K=3, Manhattan distance, with ADASYN). The significant difference lies in runtime efficiency, where KNN only requires 1. seconds, while ANN needs 110.86 seconds to achieve the highest accuracy value. Overall, the results indicate that both algorithms produce satisfactory model performance, but KNN performs better in classification compared to ANN. The ADASYN balancing technique enhances KNN performance but reduces ANN performance.

Keywords: Classification, K-Nearest Neighbors, Artificial Neural Network, Soccer, ADASYN