

**Decision Making Support System for Medical Devices' Maintenance  
Using Fine-tuned  $k$ NN Classifier**

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**Abstract**

This paper provides an improved decision support system for selecting the most appropriate maintenance strategy. Manually selecting the best maintenance strategy for medical devices requires a lot of expertise, therefore this paper suggests an efficient automated system based on fine-tuned  $k$  Nearest Neighbour classifier. Genetic Algorithm was used to select the best input weights and giving appropriate weights to each maintenance strategy. Several input variables were used that include device price, age, equipment management number, repair cost, availability, and utilisation. Accuracy of the modified  $k$  Nearest Neighbour model was compared to several well-known classifiers such as Decision Tree, Support Vector Machine, and Linear Discriminant Analysis based on collected data from 735 unique medical devices. Results shows that the simple yet fine-tuned  $k$  Nearest Neighbour model can choose the best maintenance strategy accurately and outperform other sophisticated classifiers.

**Keywords**

Medical devices maintenance,  $k$  Nearest Neighbour, Genetic Algorithm, Maintenance strategy.