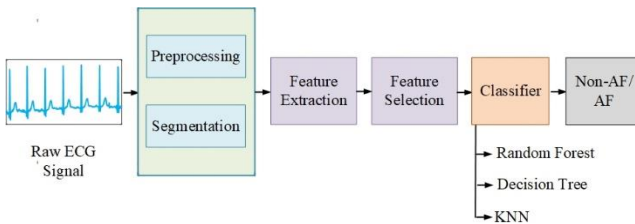


# Detection of Persistent Atrial Fibrillation Using ECG Signal

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Persistent atrial fibrillation (PersAF) is a category of atrial fibrillation (AF) that lasts for about a week and recovers easily. So, lack of intervention may raise the complexity resulting in chronic AF. Therefore, early detection of PersAF demands more efficient automatic detection algorithms. This study proposes an automated machine learning-based algorithm for detecting PersAF using a single-lead electrocardiogram (ECG) signal. Among the set of time, frequency, and entropy features extracted from ECG, the best combination of features selected by deploying feature selection algorithms was used to train the k-nearest neighbor (KNN), decision tree (DT), and random forest (RF) classifiers. The model was trained and tested using 105 subjects and validated using 10 fold cross-validation technique. RF provided the best performance with  $95.40 \pm 2.28\%$  accuracy,  $96 \pm 2.81\%$  sensitivity,  $93.42 \pm 5.81\%$  specificity and  $0.94 \pm 0.04$  F1-score.



An overview of the proposed model for persistent AF classification using ECG-derived features.

The Classification Performance

Classifier	Accuracy (%)	Sensitivity (%)	Specificity (%)	Precision (%)	F1 Score
KNN	$88.20 \pm 4.52$	$90.24 \pm 5.62$	$83.40 \pm 10.32$	$84.40 \pm 8.70$	$0.86 \pm 0.07$
DT	$92.70 \pm 2.92$	$94.27 \pm 3.16$	$89.51 \pm 6.70$	$90 \pm 6.20$	$0.91 \pm 0.04$
RF	$95.4 \pm 2.28$	$96 \pm 2.81$	$93.42 \pm 5.81$	$93 \pm 5.70$	$0.94 \pm 0.04$