Model Development Phase Template

Date	22 JUNE 2025
Project Title	Classification of Arrhythmia by Using Deep Learning with 2-D ECG Spectral Image Representation
Maximum Marks	6 Marks

Model Selection Report

In the forthcoming Model Selection Report, various models will be outlined, detailing their descriptions, hyperparameters, and performance metrics, including Accuracy or F1 Score. This comprehensive report will provide insights into the chosen models and their effectiveness.
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Model	**Description**	**Hyperparameters**	**Performance Metric (F1 Score)**
Shallow CNN	Simple convolutional neural network with one convolutional layer and one dense layer.	Conv2D(16), Dense(64), Dropout(0.3)	67%
Deep CNN	Deeper CNN with three convolutional layers for richer feature extraction.	Conv2D(32,64,128), Dense(256), Dropout(0.5)	91%
CNN + LSTM	Combines CNN for spatial feature extraction and LSTM for sequence modeling.	Conv2D(32,64), LSTM(64), Dense(128), Dropout(0.5)	80%
CNN + GRU + Attention	CNN with GRU and attention mechanism for focused sequence modeling.	Conv2D(32,64), GRU(64), Attention, Dense(128), Dropout(0.5)	60%

Summary:

The Deep CNN model achieved the highest F1 Score (91%), indicating strong and balanced performance across all arrhythmia classes. The CNN + LSTM model also performed well (80%), while the Shallow CNN and CNN + GRU + Attention models had lower F1 Scores (67% and 60%, respectively). Based on these results, the Deep CNN is selected as the final model for deployment in this project.