

(54) Title of the invention : EXPLAINABLE AND ADAPTIVE DEEP LEARNING SYSTEM FOR EARLY CARDIOVASCULAR DISEASE PREDICTION USING ECG DATA

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(57) Abstract :  
The present invention relates to an explainable and adaptive deep learning system for early cardiovascular disease prediction using ECG data (100). It incorporates an ECG signal input module (102) to receive raw signals and a demographic data integration unit (104) to add patient-specific data. An input layer (106) feeds this combined input into dense layer 1 (108), followed by batch normalization layer 1 (110). An attention layer (112) highlights key ECG segments, with deeper features extracted via dense layer 2 (114) and dense layer 3 (118), normalized by batch normalization layer 2 (116). An output layer (122) performs multi-label classification. An explainability layer (120) uses SHAP and LIME for transparent predictions. A training and optimization module (124) and evaluation and validation module (126) ensure model accuracy, robustness, and interpretability. Reference Fig 1

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