

Continuation/Research Progression Projects Form (7)

Required for projects that are a continuation/progression in the same field of study as a previous project. This form must be accompanied by the previous year's abstract and Research Plan/Project Summary.

Student's Name(s) Aditya Kendre

To be completed by Student Researcher: List all components of the current project that make it new and different from previous research. The information must be on the form; use an additional form for previous year and earlier projects.

Components	Current Research Project	Previous Research Project: Year: <u>19-20</u>
1. Title	Generative Adversarial Networks for PCG Arrhythmia Detection	ECG-Based Abnormal Heartbeat Classification: A Deep Learning Approach for Arrhythmia Detection
2. Change in goal/purpose/objective	To create a lightweight, precise, and accurate model for predicting heart arrhythmias in Phonocardiograms using a Generative Adversarial Network capable of exceeding Cardiologists' accuracy.	To create a model capable of surpassing the accuracy of Cardiologists in identifying heart arrhythmias in Electrocardiograms.
3. Changes in methodology	A Generative Adversarial Networks comprises of two models: a generator model and a classifier model (which contains a Convolutional Neural Network). The generator creates artificial PCG data to deceive the classifier into predicting the data is a real PCG signal while simultaneously being fed true PCG data from a dataset.	A Convolutional Neural Network extracts latent features from an electrocardiogram database following a fully-connected Linear layer that predicts whether an arrhythmia is present within the electrocardiogram, based upon the features extracted by the CNN.
4. Variable studied	<p>Manipulated variables include: Learning Rate, Batch size, Number of Epochs, Hidden Layers, Hidden Units, Activations Functions, and level of Data Augmentation.</p> <p>Responding variables include: Loss, Accuracy, Recall, Precision, F-Beta Score, F1 Score, and ROC and AUC.</p>	<p>Manipulated variables include: Number of layers, Hidden Units, and the level of Data Augmentation.</p> <p>Responding variables include: Loss and Accuracy.</p>
5. Additional changes	Conversion between ECG and PCG signals using an Autoencoder.	ECG signal with a one-dimensional CNN.

Attached are:

☒ Abstract and Research Plan/Project Summary, Year 19-20

I hereby certify that the above information is correct and that the current year Abstract & Certification and project display board properly reflect work done only in the current year.

Aditya Kendre

10/30/20

Student's Printed Name(s)

Signature

Date of Signature (mm/dd/yy)