**Computer Science Capstone Topic Approval Form**

The purpose of this document is to help you clearly explain your capstone topic, project scope, and timeline. Identify each of these areas so that you will have a complete and realistic overview of your project. Your course instructor cannot sign off on your project topic without this information*.*

*Note: You must fill out and submit this form. Space beneath each number will expand as needed.*

*Any cost associated with developing the application will be the responsibility of the student.*

**INFORM INSTRUCTOR:**

Potential use of proprietary company information: (Y/N)

**ANALYSIS:**

1. Project topic AND description:
2. Project purpose/goals:

Descriptive Method:

Non-Descriptive Method:

**DESIGN and DEVELOPMENT:**

1. Computer science application type (select one):

* Mobile (indicate Apple or Android)
* Web
* Stand-Alone

1. Programming/development language(s) you will use:
   1. Python 3.8 for general purpose needs.
   2. Python 3.8 – Anaconda distribution for machine learning models and data processing.
   3. Python 3.8 with Flask web framework for web server functionality (*may not be required*).
   4. [Serverless Framework](https://www.serverless.com/) or [AWS Serverless Application Model (SAM)](https://aws.amazon.com/serverless/sam/) for architecting and deploying back-end functionality.
   5. React.js framework (JavaScript/TypeScript) for presentation layer as a single-page application.
2. Operating System(s)/Platform(s) you will use:
   1. Ubuntu 20.04.1 (Linux OS) for prototyping and development.
   2. Amazon Web Services (AWS) for hosting requirements.
   3. [AWS Simple Storage Service (S3)](https://aws.amazon.com/s3/) for static content storage and delivery (including front-end web application).
   4. [AWS Lambda](https://aws.amazon.com/lambda/) for data processing and all back-end functionality and deployment.
3. Database Management System you will use:
   1. [Amazon Aurora Serverless Database (PostgreSQL)](https://aws.amazon.com/rds/aurora/serverless/) for relational data.
   2. [Amazon DynamoDB (NoSQL document storage)](https://aws.amazon.com/dynamodb/) for image metadata and non-relational data.
4. Estimated number of hours for the following:
   * 1. Planning and Design: 30-60
     2. Development: 50-100
     3. Documentation: 20-40
     4. Total: 100-200
5. Projected completion date:

December 10, 2020

**IMPLEMENTATION and EVALUATION:**

1. Describe how you will approach the execution of your project:
   1. Training data in the form of existing chest x-ray imaging will be collected along with the diagnostic determinations made by trained radiologists for each scan. The data will be collated for preparation to be used in machine learning models. Unusuable scans or data will be discarded and removed from training or test data.
   2. A randomized selection of data (approximately 10,000 samples) will be used to train the models. A validation set of data will be set aside and used for evaluation.
   3. An evaluation will be performed on the results of the training set. If a less than adequate modelling result is obtained, the model will be retrained with modified parameters or additional data until a reasonable accuracy has been obtained for classification.
   4. Once a prediction model of 90% or greater is obtained, the model will be adapted to function as a web service for classifying new chest x-rays and providing diagnosticians additional information as scans are created in real time.
   5. Training data and prediction information will be collated for the purposes of data visualization regarding the model and the data used to train the model. This will be used as reference material to demonstrate the efficacy of the model in the presentation layer of the application.
   6. A single-page web application will be created to display the data, data visualizations, and documentation created while developing the model and service. Additionally, a graphical user interface will be provided for interacting with the prediction model service that allows a user to provide their own sample data and allow the model to make predictions. Unused training data will be set aside for demonstration purposes to allow a user without data to interact with the service and get a full demonstration of how to use the service.

**This project does not involve human subjects research and is exempt from WGU IRB review.**

**STUDENT SIGNATURE**

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**By signing and submitting this form, you acknowledge** any cost associated with development and execution of the application will be your (the student) responsibility.

**COURSE INSTRUCTOR’S NAME:**

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**COURSE INSTRUCTOR APPROVAL DATE:**