**SINGAPORE POLYTECHNIC**

**SCHOOL OF COMPUTING**

DIPLOMA IN APPLIED AI AND ANALYTICS (DAAA)

Module Code : ST1505

Module Name : DEVOPS AND AI AUTOMATION

Acad Year/Semester : 2021/2022 Semester 2

Assignment Title : CA1 – DEVOPS FOR CLASSICAL ML APP

Assignment Type : Individual

Weighting : 40%

Deadline : Week 7 – 3rd Dec 2021 (Friday), 2359 hrs

Mode of Submission : Online Submission via [esp.sp.edu.sg](https://esp.sp.edu.sg/)

Please follow the instructions on BB on how to

submit

Late Submission

50% of the marks will be deducted for assignments that are received within ONE (1) calendar day after the submission deadline. No marks will be given thereafter.

Exceptions to this policy will be given to students with valid LOA on medical or compassionate grounds. Students in such cases will need to inform the lecturer as soon as reasonably possible. Students are not to assume on their own that their deadline has been extended.

CA1 – DEVOPS FOR CLASSICAL ML APP

1. Objectives

Through this assignment, you should be able to:

* + Create a devops process for continuous development and integration for a classical ML web application.
  + Use Flask,Gitlab for a ML web application

The goal of this assignment is to encourage you to think critically about how to develop a devops process for ML models that can be deployed as a web application.

1. Assignment theme

Machine Learning Web Application for Regression

<https://www.kaggle.com/datasets?search=regression>

Datasets that are part of AIML module should not be considered.

Deliverables Part I (Project GitLab and Heroku site)

In this assignment, you are required to do the following:

1. Set up a GitLab project using your GMail account that you have created in class. The naming convention for your project is:  
   CA1-[*class*]-[*admin id*]-[*Name*]
2. Set up a SCRUM board for your development process
3. You must have 6 branches from your git repository.  
   How the 6 branches are being created is based on the weekly submission in your practical.
4. The master branch must be merged after you have completed each of the branches
5. Set up 2 Heroku sites, one for live and the other for staging.  
   The naming convention for your Heroku site is:  
   CA1-[*class*]-[*last 4 digit of admin id*]-[*Name*]-Prod  
   CA1-[*class*]-[*last 4 digit of admin id*]-[*Name*]-Staging
6. Set up the PostgreSQL server
7. Add your lecturer Gitlab account and Heroku account to your site

Deliverables Part II (ML Website Using Flask)

You are required to deliver the following for the ML Web application:

1. A classical ML technique (not deep learning) to produce a regression model based on the selected dataset.
2. You must submit your jupyter notebook where the training is done.
3. Create wireframes for your web application.
4. Make use of Flask web development to deploy your ML model to a web application. For ease of assessment, you can only use Flask, Jinja2, SQLAlchemy and Bootstrap CSS. You must **NOT** use any javascript, or front end framework such as Angular, JQuery as this may result in a loss of marks.
5. You must use PostgreSQL to store your prediction history.
6. Login credentials
7. Prediction history is stored based on user

Deliverables Part III (Testing Using PyTest)

You are required to perform the following for testing:

1. Unit testing for at least 2 classes.
2. Unit testing must show:
   1. Validity testing
   2. Range testing
   3. Consistency testing
   4. Unexpected failure testing
   5. Expected failure testing
3. Create the web api for key crucial operations and the prediction and probability functionality.
4. Testing on all the api created

Deliverables Part IV (CI/CD Deployment)

You are required to perform the following for testing

1. Create an Automated CI/CD process using Gitlab and Heroku as part of deployment process
2. Automate your testing in Part III using the Gitlab

Deliverables Part V (Presentation)

You are required to perform the following for the presentation.

1. You are required to do a 5 minutes presentation using PowerPoint slides.
2. Present on the overall concepts and features of your web application. You are not required to show coding.
3. Demonstrate your product.

**Note:** You must present your work and demo to ascertain the authenticity of your work is in order. Zero marks will be awarded for all other components if the authenticity of your work cannot be ascertained.

1. Marking criteria

Part I: 20%

|  |  |  |
| --- | --- | --- |
| Categories | Description | % |
| Sites | Set up both Gitlab and Heroku with proper naming convention | 5 |
| Scrum Board | Create a Scrum Board for project management | 5 |
| Agile Process | Proper use of Scrum Board for tracking progress | 5 |
| Git | Managing git branches according to requirement | 5 |
| TOTAL | | 20 |

Part II: 50%

|  |  |  |
| --- | --- | --- |
| Categories | Description | % |
| ML Models | Feature engineering for your data | 5 |
| Training and exporting of ML model based on the data set that you have selected | 5 |
| Design | Wireframes for your website and design for your web site | 5 |
| UI creation | Create the UI needed for your web site | 5 |
| Backend | Send in prediction | 5 |
| Obtain prediction | 5 |
| Store prediction | 5 |
| Review history of prediction based on user | 5 |
| Login credential | 5 |
| Remove history record baked on user | 5 |
| TOTAL | | 50 |

Part III: 20%

|  |  |  |
| --- | --- | --- |
| Categories | Description | % |
| Unit Test | Create Testing on at least 2 relevant classes | 2 |
| Validity testing  Range testing  Consistency testing  Unexpected failure testing  Expected failure testing | 5 |
| API | Create Web API for testing | 5 |
| Setup pytesting for flask | 3 |
| API testing using parametrize | 5 |
| TOTAL | | 20 |

Part IV: 5%

|  |  |  |
| --- | --- | --- |
| Categories | Description | % |
| CI/CD setup | Write a YAML script to deploy your application to Heroku | 3 |
| Automated testing | Create automated test for your CI/CD process | 2 |
| TOTAL | | 5 |

Part V: 5%

|  |  |  |
| --- | --- | --- |
| Categories | Description | % |
| Presentation | PowerPoint to Illustrate the overall concept of the project | 3 |
| Presentation | 2 |
| TOTAL | | 5 |

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