MLOPs Final Project Report

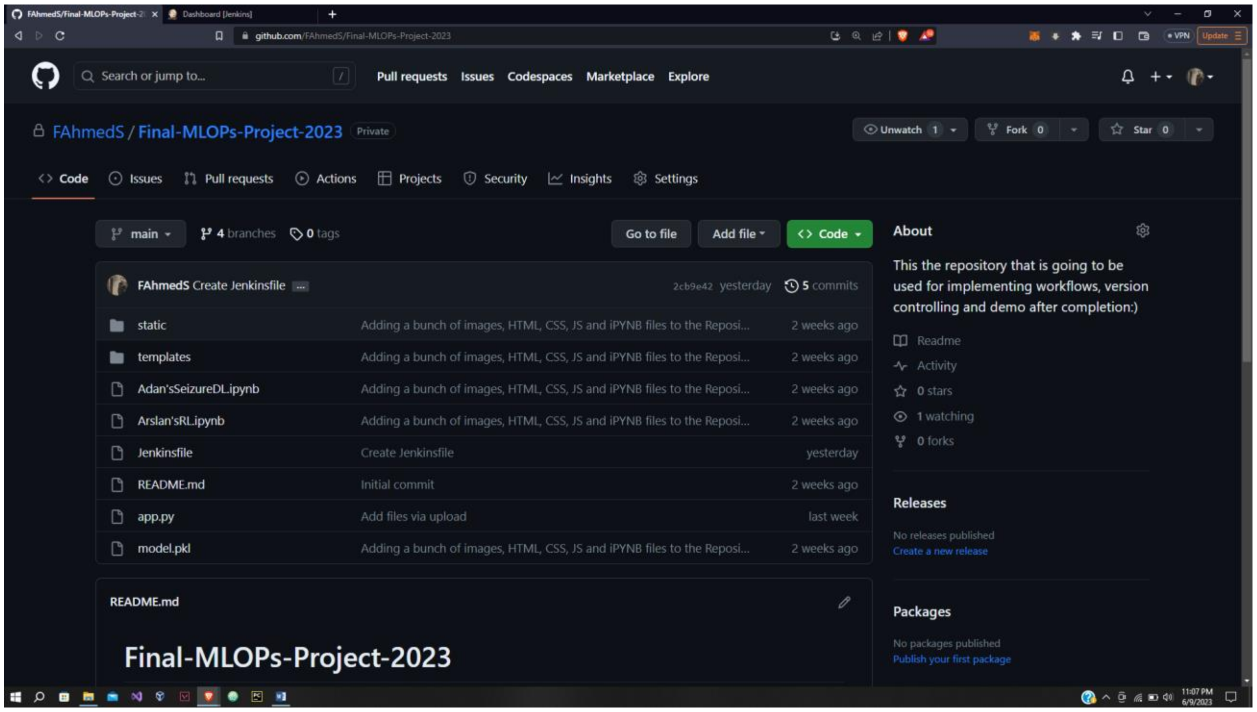
Group members:

- Faisal Ahmed Siddiqui
- Adan Nazir
- Zaid Khan

Section: AI-J

Steps: Just followed the Evaluation criteria for implementation.

1. Github & Git used for Version controlling:



FAhmedS / Final-MLOPs-Project-2023 Private

FAhmedS Create Jenkinsfile ... 2cb9e42 yesterday 5 commits

static	Adding a bunch of images, HTML, CSS, JS and iPYNB files to the Reposi...	2 weeks ago
templates	Adding a bunch of images, HTML, CSS, JS and iPYNB files to the Reposi...	2 weeks ago
Adan'sSeizureDL.ipynb	Adding a bunch of images, HTML, CSS, JS and iPYNB files to the Reposi...	2 weeks ago
Arslan'sRL.ipynb	Adding a bunch of images, HTML, CSS, JS and iPYNB files to the Reposi...	2 weeks ago
Jenkinsfile	Create Jenkinsfile	yesterday
README.md	Initial commit	2 weeks ago
app.py	Add files via upload	last week
model.pkl	Adding a bunch of images, HTML, CSS, JS and iPYNB files to the Reposi...	2 weeks ago

README.md

Final-MLOPs-Project-2023

About

This the repository that is going to be used for implementing workflows, version controlling and demo after completion:)

Readme
Activity
0 stars
1 watching
0 forks

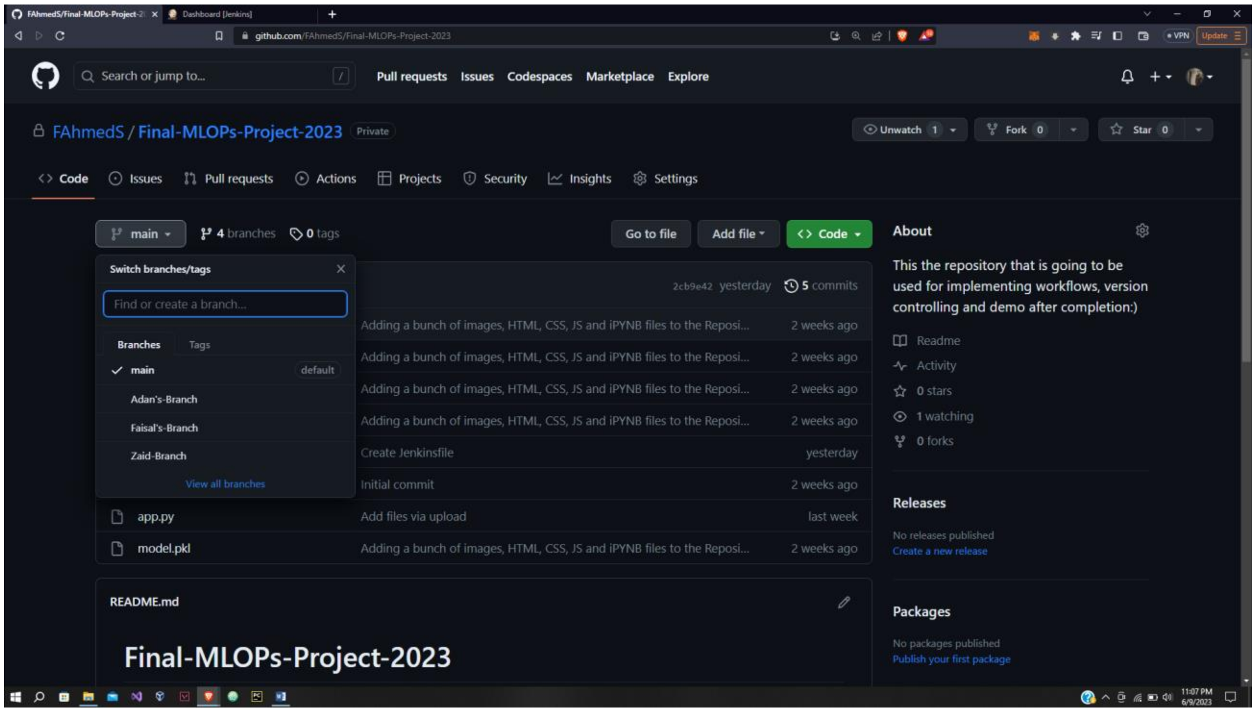
Releases

No releases published
Create a new release

Packages

No packages published
Publish your first package

2. Branches created.



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Code · Issues · Pull requests · Actions · Projects · Security · Insights · Settings

main · 4 branches · 0 tags · Go to file · Add file · Code

Switch branches/tags

Find or create a branch...

Branches · Tags

- main (default)
- Adan's-Branch
- Faisal's-Branch
- Zaid-Branch

View all branches

	2cb9e42 yesterday	5 commits
	Adding a bunch of images, HTML, CSS, JS and iPYNB files to the Reposi...	2 weeks ago
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README.md

Final-MLOPs-Project-2023

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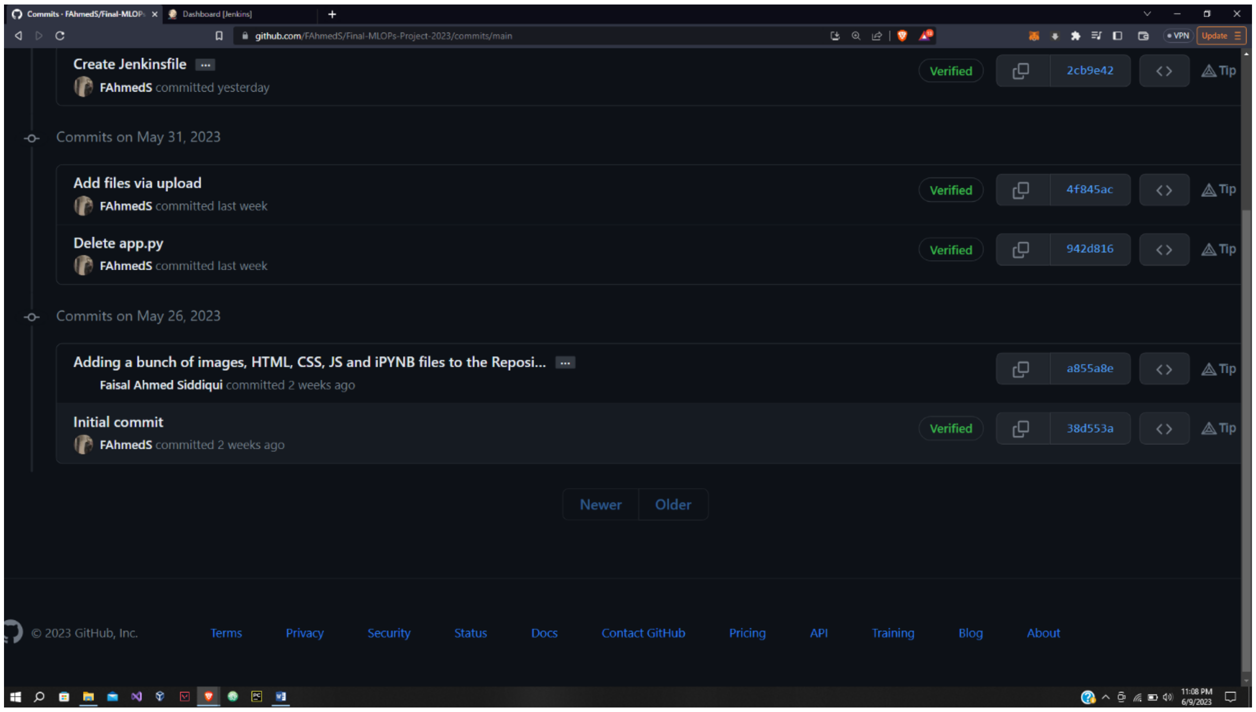
Readme · Activity · 0 stars · 1 watching · 0 forks

Releases: No releases published · Create a new release

Packages: No packages published · Publish your first package

3. Created meaningful commit



github.com/FAhmedS/Final-MLOPs-Project-2023/commits/main

Create Jenkinsfile — FAhmedS committed yesterday — Verified — 2cb9e42

Commits on May 31, 2023

Add files via upload — FAhmedS committed last week — Verified — 4f845ac

Delete app.py — FAhmedS committed last week — Verified — 942d816

Commits on May 26, 2023

Adding a bunch of images, HTML, CSS, JS and iPYNB files to the Reposi... — Faisal Ahmed Siddiqui committed 2 weeks ago — a855a8e

Initial commit — FAhmedS committed 2 weeks ago — Verified — 38d553a

Newer · Older

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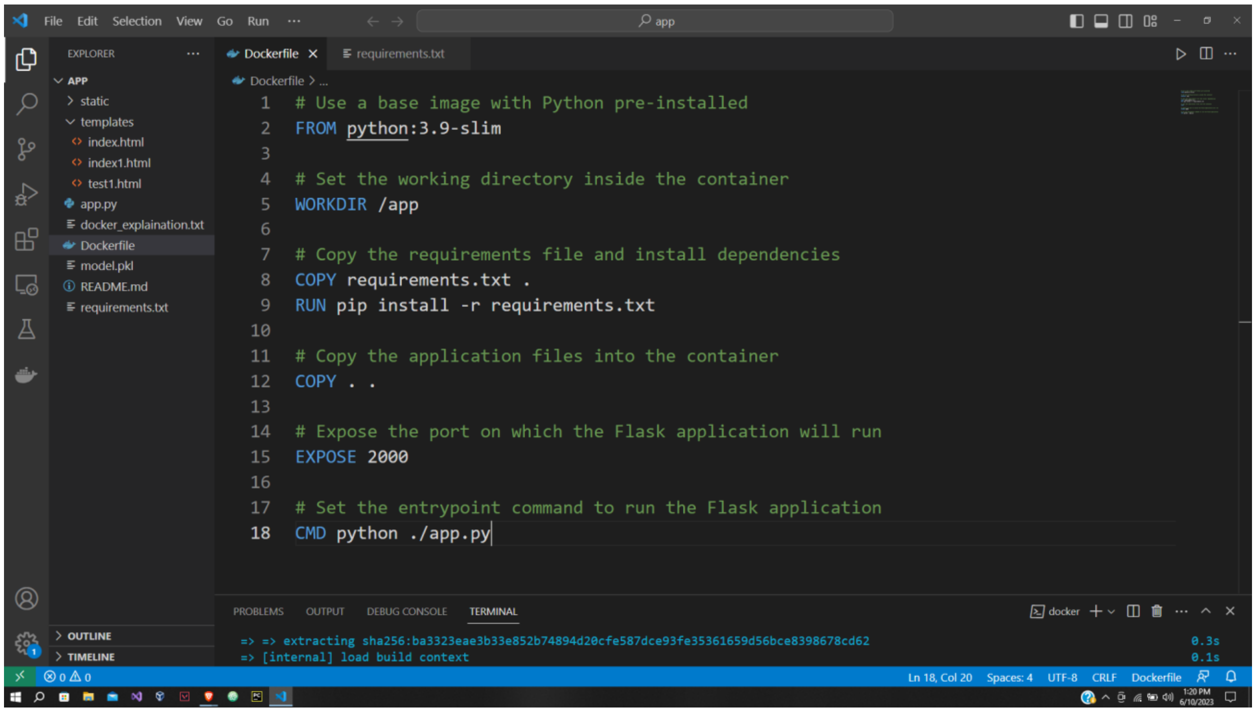
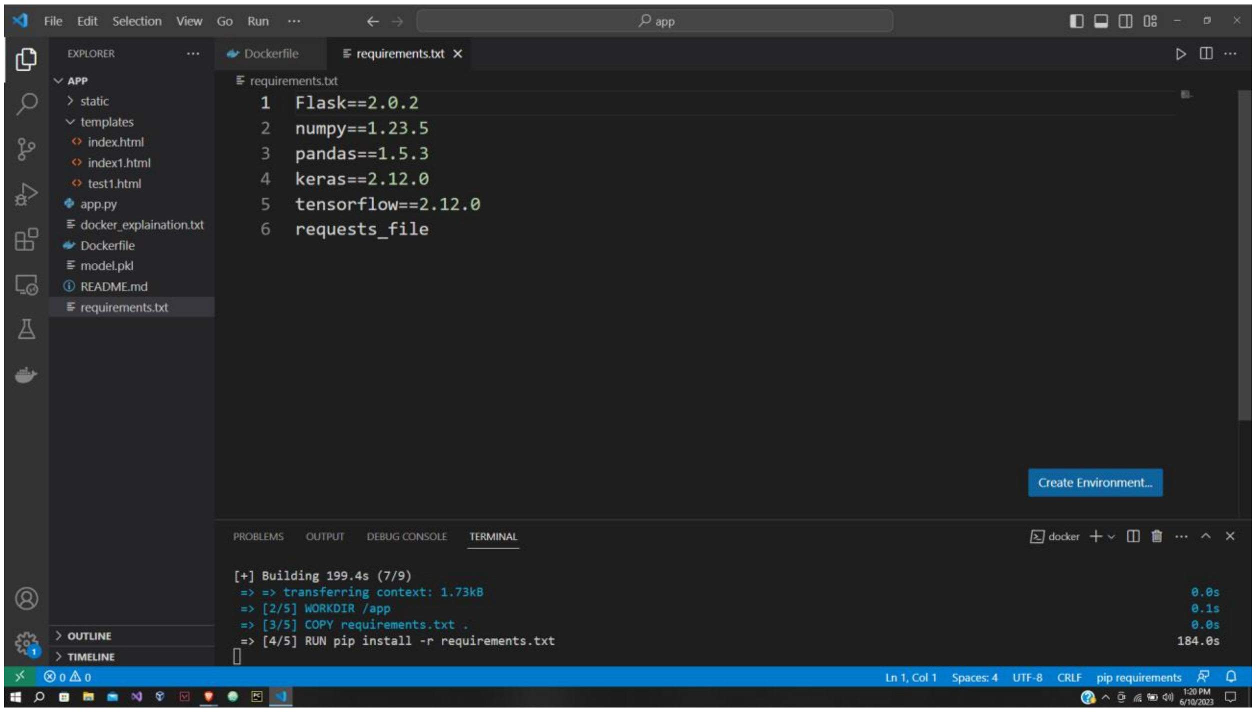
4. **Docker/Containerization:** For containerization used VS code with docker plugin, then made Dockerfile and requirments.txt file for image making:



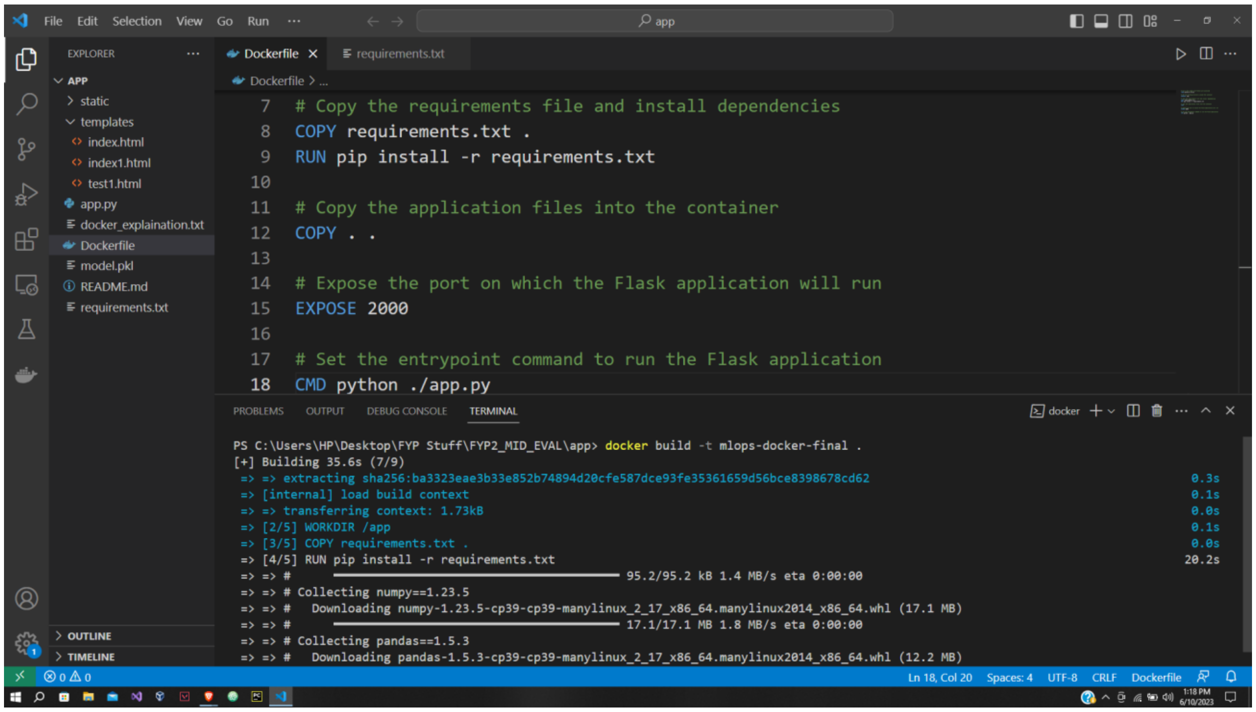
```
# Use a base image with Python pre-installed
FROM python:3.9-slim

# Set the working directory inside the container
WORKDIR /app

# Copy the requirements file and install dependencies
COPY requirements.txt .
RUN pip install -r requirements.txt

# Copy the application files into the container
COPY . .

# Expose the port on which the Flask application will run
EXPOSE 2000

# Set the entrypoint command to run the Flask application
CMD python ./app.py
```

```
=> => extracting sha256:ba3323eae3b33e852b74894d20cfe587dce93fe35361659d56bce8398678cd62    0.3s
=> [internal] load build context                                                            0.1s
```



```
Flask==2.0.2
numpy==1.23.5
pandas==1.5.3
keras==2.12.0
tensorflow==2.12.0
requests_file
```

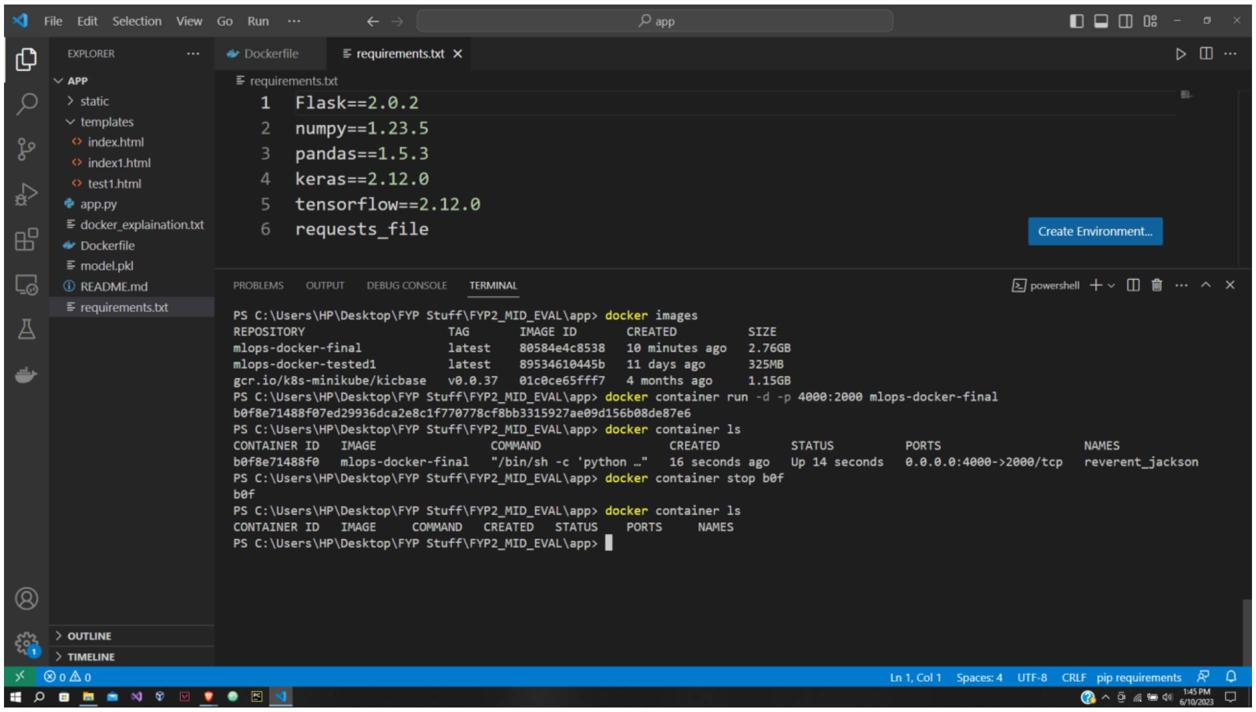
```
[+] Building 199.4s (7/9)
 => => transferring context: 1.73kB                                     0.0s
 => [2/5] WORKDIR /app                                                  0.1s
 => [3/5] COPY requirements.txt .                                       0.0s
 => [4/5] RUN pip install -r requirements.txt                         184.0s
```



```
# Copy the requirements file and install dependencies
COPY requirements.txt .
RUN pip install -r requirements.txt

# Copy the application files into the container
COPY . .

# Expose the port on which the Flask application will run
EXPOSE 2000

# Set the entrypoint command to run the Flask application
CMD python ./app.py
```

```
PS C:\Users\HP\Desktop\FYP Stuff\FYP2_MID_EVAL\app> docker build -t mlops-docker-final .
[+] Building 35.6s (7/9)
 => => extracting sha256:ba3323eae3b33e852b74894d20cfe587dce93fe35361659d56bce8398678cd62          0.3s
 => [internal] load build context                                                                   0.1s
 => => transferring context: 1.73kB                                                                 0.0s
 => [2/5] WORKDIR /app                                                                              0.1s
 => [3/5] COPY requirements.txt .                                                                   0.0s
 => [4/5] RUN pip install -r requirements.txt                                                      20.2s
 => => #          ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 95.2/95.2 kB 1.4 MB/s eta 0:00:00
 => => # Collecting numpy==1.23.5
 => => #   Downloading numpy-1.23.5-cp39-cp39-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (17.1 MB)
 => => #          ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 17.1/17.1 MB 1.8 MB/s eta 0:00:00
 => => # Collecting pandas==1.5.3
 => => #   Downloading pandas-1.5.3-cp39-cp39-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (12.2 MB)
```

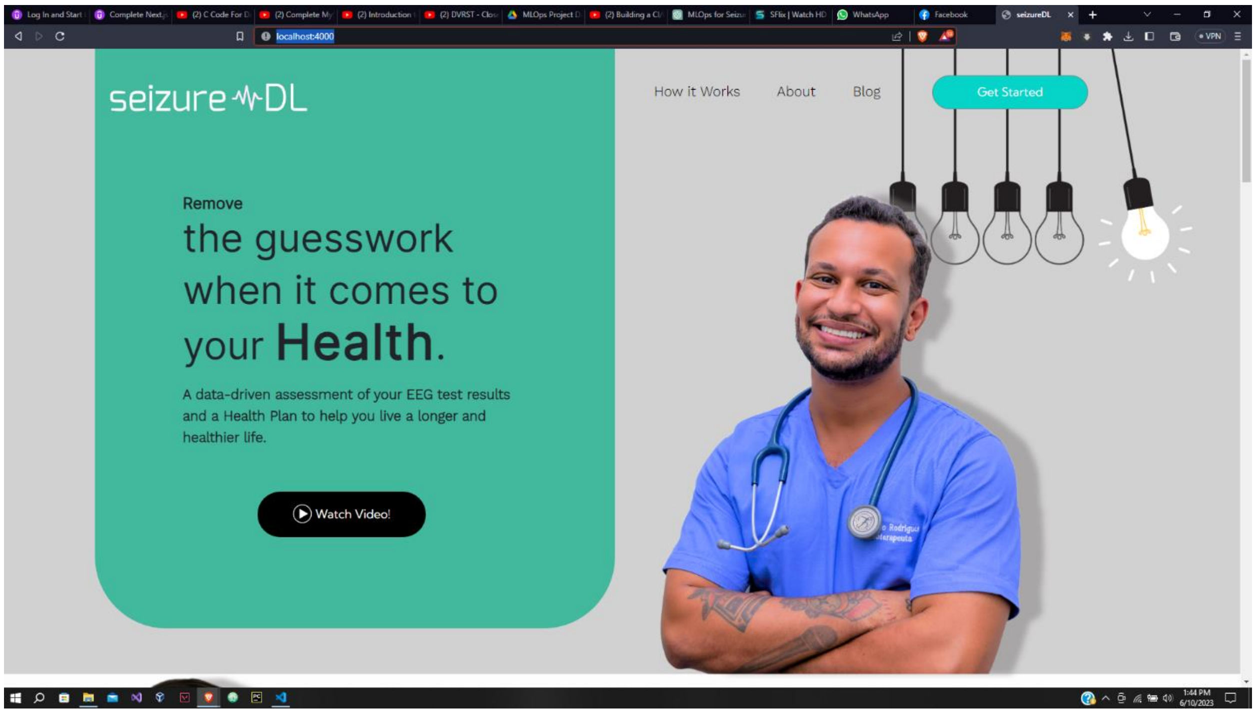
5. Created image successfully then ran container on the localhost 4000, flask application runs on the calhost:4000 AND then stopped container as well:



```
Flask==2.0.2
numpy==1.23.5
pandas==1.5.3
keras==2.12.0
tensorflow==2.12.0
requests_file
```

```
PS C:\Users\HP\Desktop\FYP Stuff\FYP2_MID_EVAL\app> docker images
REPOSITORY                  TAG       IMAGE ID       CREATED          SIZE
mlops-docker-final          latest    80584e4c8538   10 minutes ago   2.76GB
mlops-docker-tested1        latest    89534610445b   11 days ago      325MB
gcr.io/k8s-minikube/kicbase   v0.0.37   01c0ce65fff7   4 months ago     1.15GB
PS C:\Users\HP\Desktop\FYP Stuff\FYP2_MID_EVAL\app> docker container run -d -p 4000:2000 mlops-docker-final
b0f8e71488f07ed29936dca2e8c1f770778cf8bb3315927ae09d156b08de87e6
PS C:\Users\HP\Desktop\FYP Stuff\FYP2_MID_EVAL\app> docker container ls
CONTAINER ID   IMAGE                COMMAND                  CREATED          STATUS          PORTS                    NAMES
b0f8e71488f0   mlops-docker-final   "/bin/sh -c 'python …"   16 seconds ago   Up 14 seconds   0.0.0.0:4000->2000/tcp   reverent_jackson
PS C:\Users\HP\Desktop\FYP Stuff\FYP2_MID_EVAL\app> docker container stop b0f
b0f
PS C:\Users\HP\Desktop\FYP Stuff\FYP2_MID_EVAL\app> docker container ls
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS     NAMES
PS C:\Users\HP\Desktop\FYP Stuff\FYP2_MID_EVAL\app>
```

6. Container running on locahost:4000:



Remove
the guesswork
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your **Health.**

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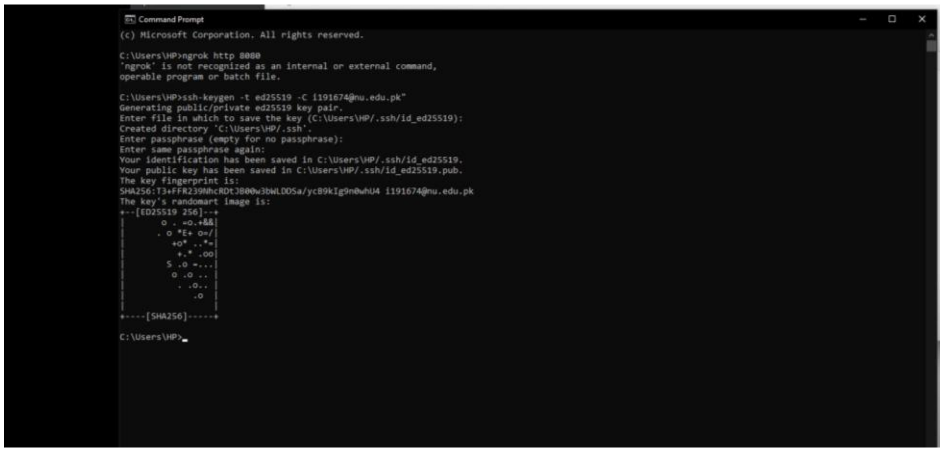
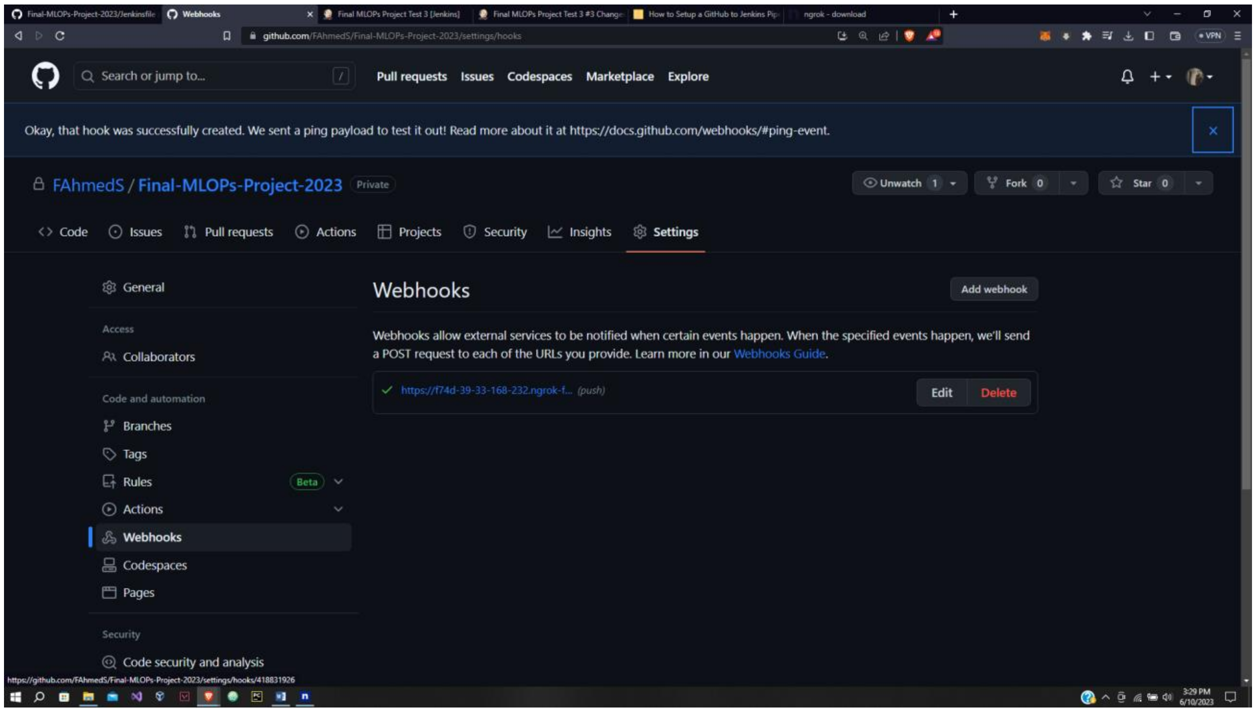
7. CI/CD pipeline using Jenkins:
   i. For this first I integrated the GitHub to Jenkins via webhook successfully.
   ii. As the repo was private so I had to make/add credentials for SSH authorization.
   iii. For now, just created random Jenkins file to check whether build is success or not.



```
(c) Microsoft Corporation. All rights reserved.

C:\Users\HP>ngrok http 8080
'ngrok' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\HP>ssh-keygen -t ed25519 -C i191674@nu.edu.pk"
Generating public/private ed25519 key pair.
Enter file in which to save the key (C:\Users\HP/.ssh/id_ed25519):
Created directory 'C:\Users\HP/.ssh'.
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in C:\Users\HP/.ssh/id_ed25519.
Your public key has been saved in C:\Users\HP/.ssh/id_ed25519.pub.
The key fingerprint is:
SHA256:T3+FFR239NhcRDtJB00w3bWLDDSa/ycB9kIg9n0whU4 i191674@nu.edu.pk
The key's randomart image is:
+--[ED25519 256]--+
|       o . =o.+&&|
|      . o *E+ o=/|
|         +o* ..*=|
|          +.* .oo|
|        S .o =...|
|         o .o .. |
|          . .o.. |
|              .o |
|                 |
+----[SHA256]-----+

C:\Users\HP>
```



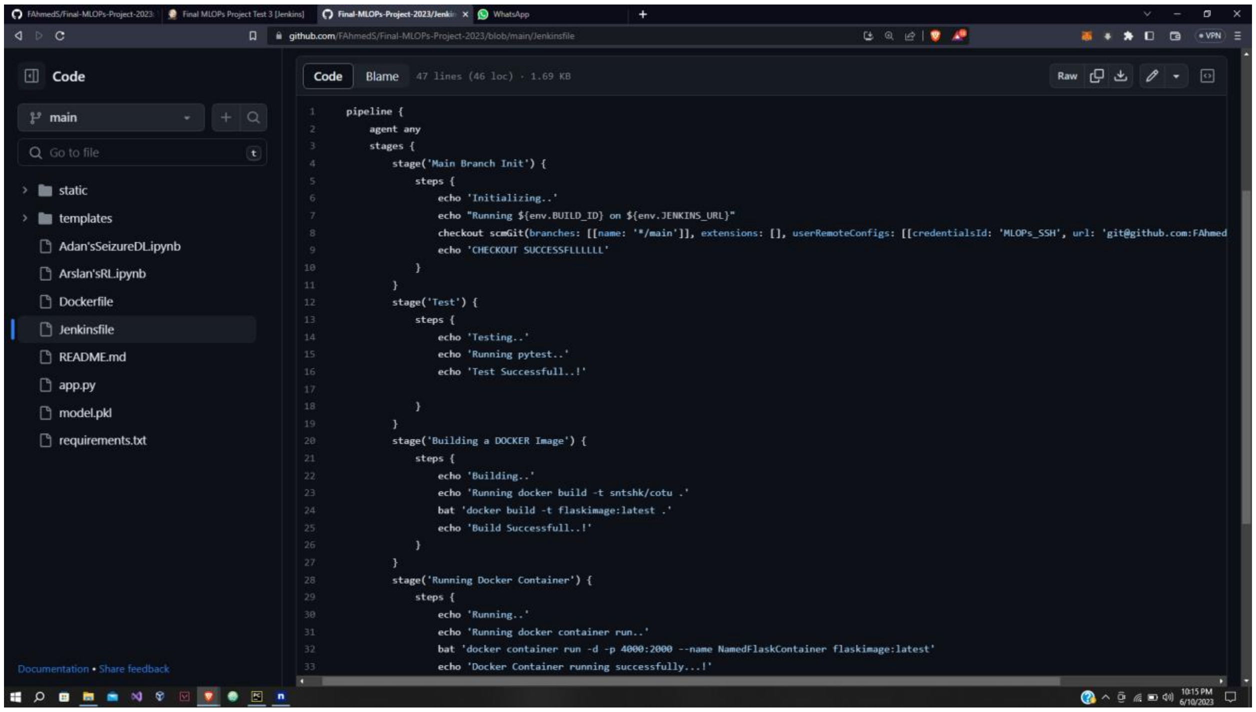
Okay, that hook was successfully created. We sent a ping payload to test it out! Read more about it at https://docs.github.com/webhooks/#ping-event.

Webhooks

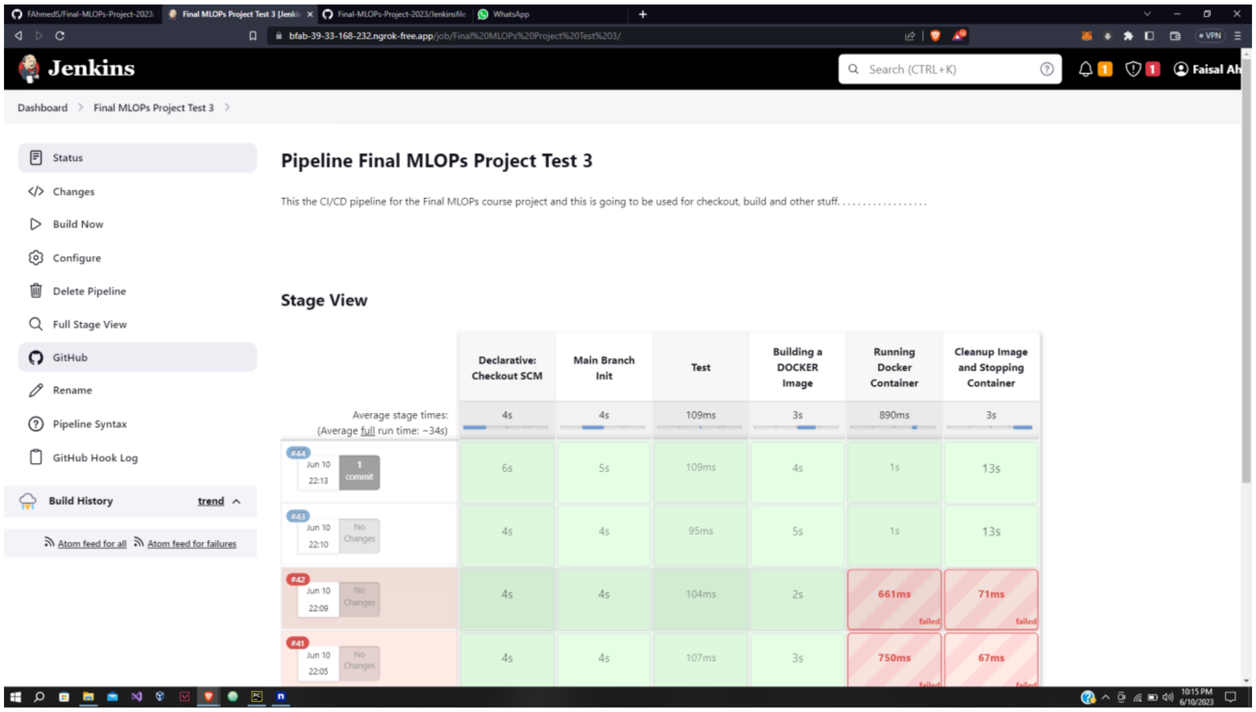
Webhooks allow external services to be notified when certain events happen. When the specified events happen, we'll send a POST request to each of the URLs you provide. Learn more in our Webhooks Guide.

✓ https://f74d-39-33-168-232.ngrok-f... (push)

8. Now Building Docker image and run container using Jenkinsfile workflow, for this made some changes to Jenkinsfile from Github and Builds were successful as shown below:



```
pipeline {
    agent any
    stages {
        stage('Main Branch Init') {
            steps {
                echo 'Initializing..'
                echo "Running ${env.BUILD_ID} on ${env.JENKINS_URL}"
                checkout scmGit(branches: [[name: '*/main']], extensions: [], userRemoteConfigs: [[credentialsId: 'MLOPs_SSH', url: 'git@github.com:FAhmed
                echo 'CHECKOUT SUCCESSFLLLLLL'
            }
        }
        stage('Test') {
            steps {
                echo 'Testing..'
                echo 'Running pytest..'
                echo 'Test Successfull..!'

            }
        }
        stage('Building a DOCKER Image') {
            steps {
                echo 'Building..'
                echo 'Running docker build -t sntshk/cotu .'
                bat 'docker build -t flaskimage:latest .'
                echo 'Build Successfull..!'
            }
        }
        stage('Running Docker Container') {
            steps {
                echo 'Running..'
                echo 'Running docker container run..'
                bat 'docker container run -d -p 4000:2000 --name NamedFlaskContainer flaskimage:latest'
                echo 'Docker Container running successfully...!'
```



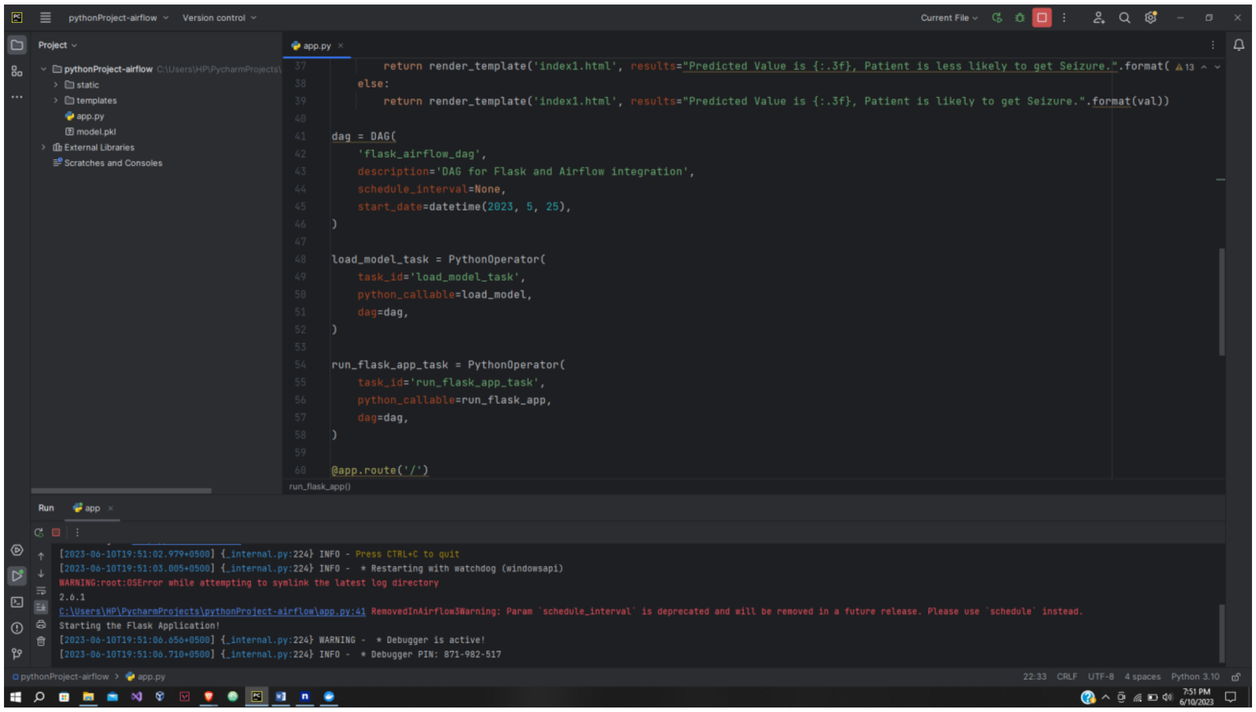
Pipeline Final MLOPs Project Test 3

This the CI/CD pipeline for the Final MLOPs course project and this is going to be used for checkout, build and other stuff.................

Stage View

	Declarative: Checkout SCM	Main Branch Init	Test	Building a DOCKER Image	Running Docker Container	Cleanup Image and Stopping Container
Average stage times: (Average full run time: ~34s)	4s	4s	109ms	3s	890ms	3s
#44 Jun 10 22:13 (1 commit)	6s	5s	109ms	4s	1s	13s
#43 Jun 10 22:10 (No Changes)	4s	4s	95ms	5s	1s	13s
#42 Jun 10 22:09 (No Changes)	4s	4s	104ms	2s	661ms failed	71ms failed
#41 Jun 10 22:05 (No Changes)	4s	4s	107ms	3s	750ms failed	67ms failed

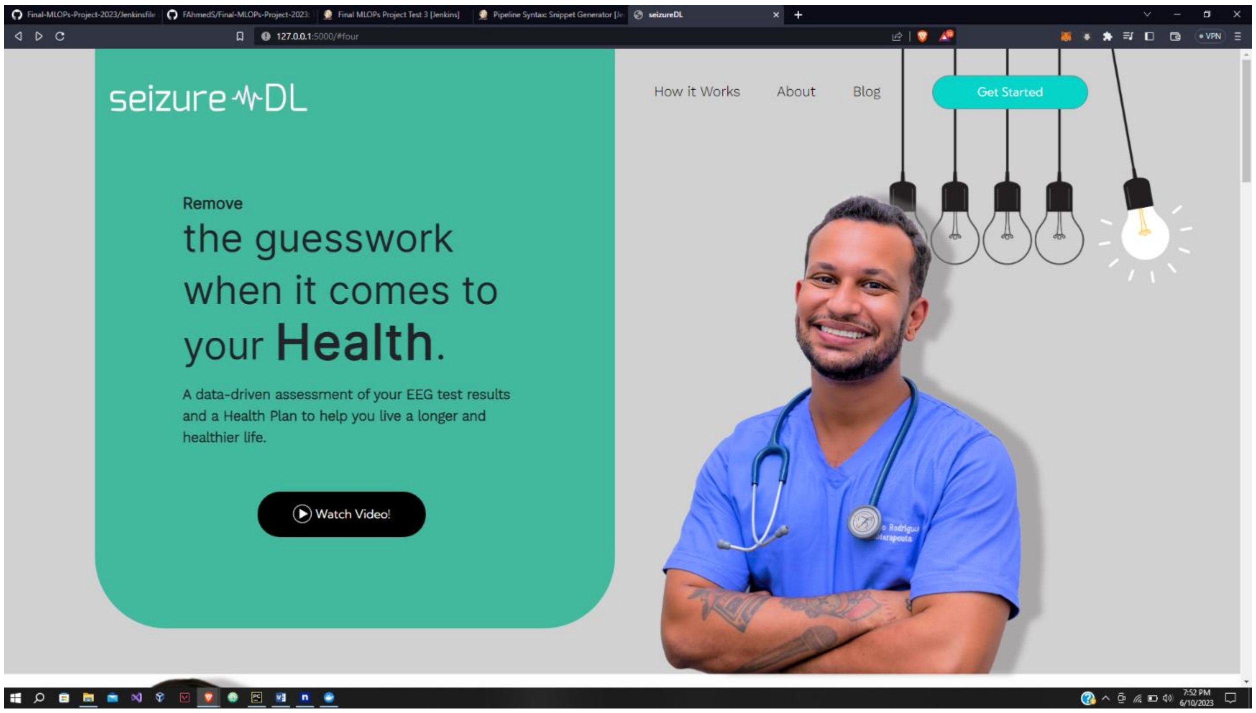
9. Now for the Apache Airflow, converted my whole flask application code to DAG compatible.



```
        return render_template('index1.html', results="Predicted Value is {:.3f}, Patient is less likely to get Seizure.".format(
    else:
        return render_template('index1.html', results="Predicted Value is {:.3f}, Patient is likely to get Seizure.".format(val))

dag = DAG(
    'flask_airflow_dag',
    description='DAG for Flask and Airflow integration',
    schedule_interval=None,
    start_date=datetime(2023, 5, 25),
)

load_model_task = PythonOperator(
    task_id='load_model_task',
    python_callable=load_model,
    dag=dag,
)

run_flask_app_task = PythonOperator(
    task_id='run_flask_app_task',
    python_callable=run_flask_app,
    dag=dag,
)

@app.route('/')
```

```
[2023-06-10T19:51:02.979+0500] {_internal.py:224} INFO - Press CTRL+C to quit
[2023-06-10T19:51:03.005+0500] {_internal.py:224} INFO -  * Restarting with watchdog (windowsapi)
WARNING:root:OSError while attempting to symlink the latest log directory
2.6.1
C:\Users\HP\PycharmProjects\pythonProject-airflow\app.py:41 RemovedInAirflow3Warning: Param `schedule_interval` is deprecated and will be removed in a future release. Please use `schedule` instead.
Starting the Flask Application!
[2023-06-10T19:51:06.656+0500] {_internal.py:224} WARNING -  * Debugger is active!
[2023-06-10T19:51:06.710+0500] {_internal.py:224} INFO -  * Debugger PIN: 871-982-517
```

10. Which works fine as can be seen:



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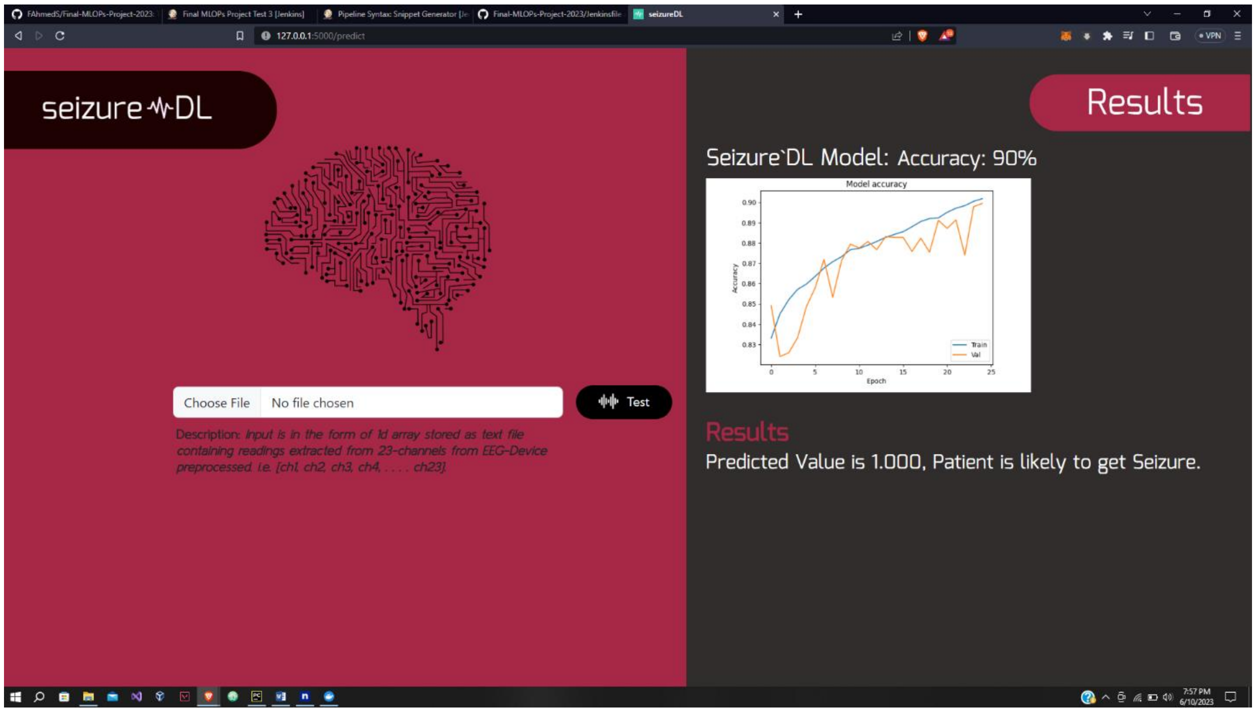
11. Prediction Value is shown:



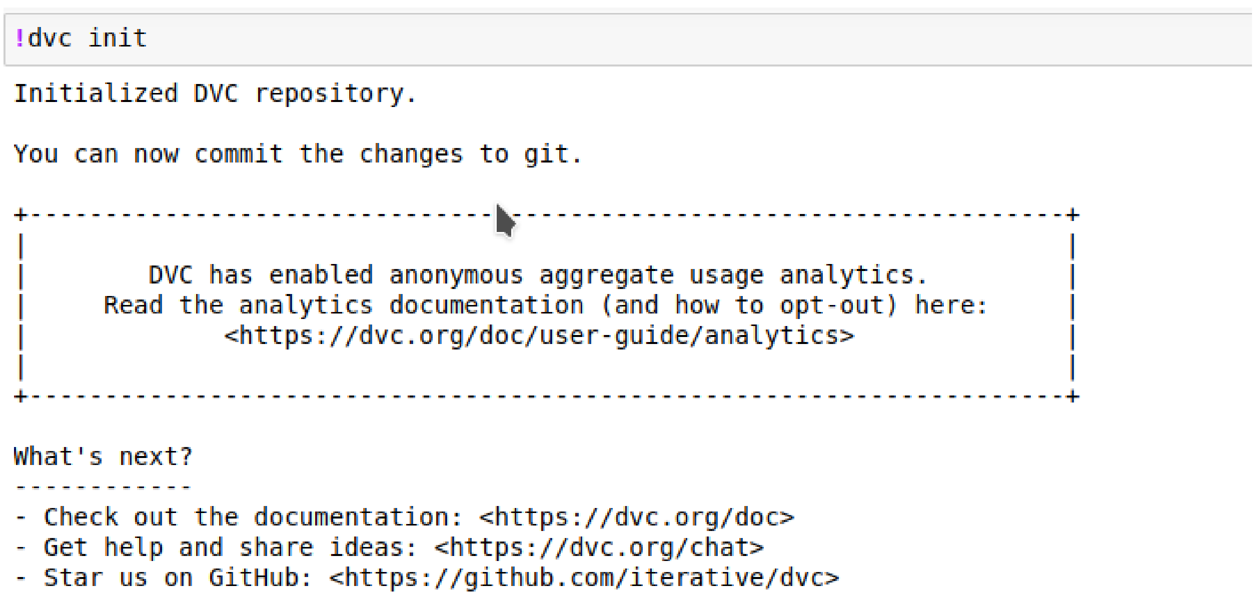
Description: input is in the form of 1d array stored as text file containing readings extracted from 23-channels from EEG-Device preprocessed. i.e. [ch1, ch2, ch3, ch4, ... ch23].

Seizure`DL Model: Accuracy: 90%

Results

Predicted Value is 1.000, Patient is likely to get Seizure.

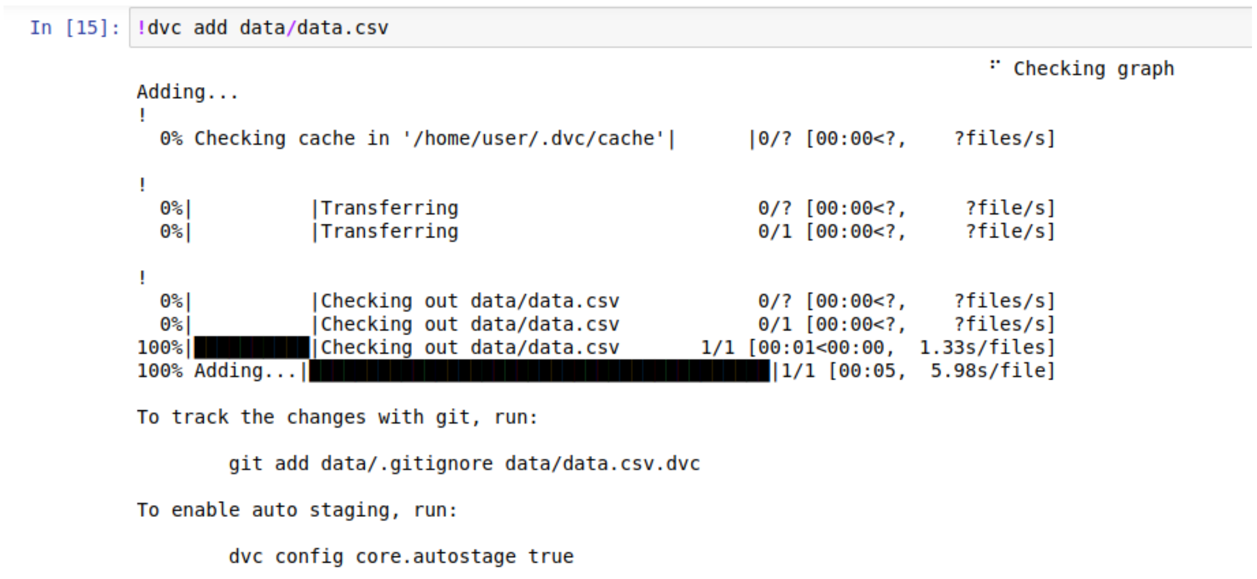
12. Initializing DVC



```
!dvc init
```

```
Initialized DVC repository.

You can now commit the changes to git.

+---------------------------------------------------------------------+
|                                                                     |
|        DVC has enabled anonymous aggregate usage analytics.         |
|     Read the analytics documentation (and how to opt-out) here:     |
|             <https://dvc.org/doc/user-guide/analytics>              |
|                                                                     |
+---------------------------------------------------------------------+

What's next?
------------
- Check out the documentation: <https://dvc.org/doc>
- Get help and share ideas: <https://dvc.org/chat>
- Star us on GitHub: <https://github.com/iterative/dvc>
```

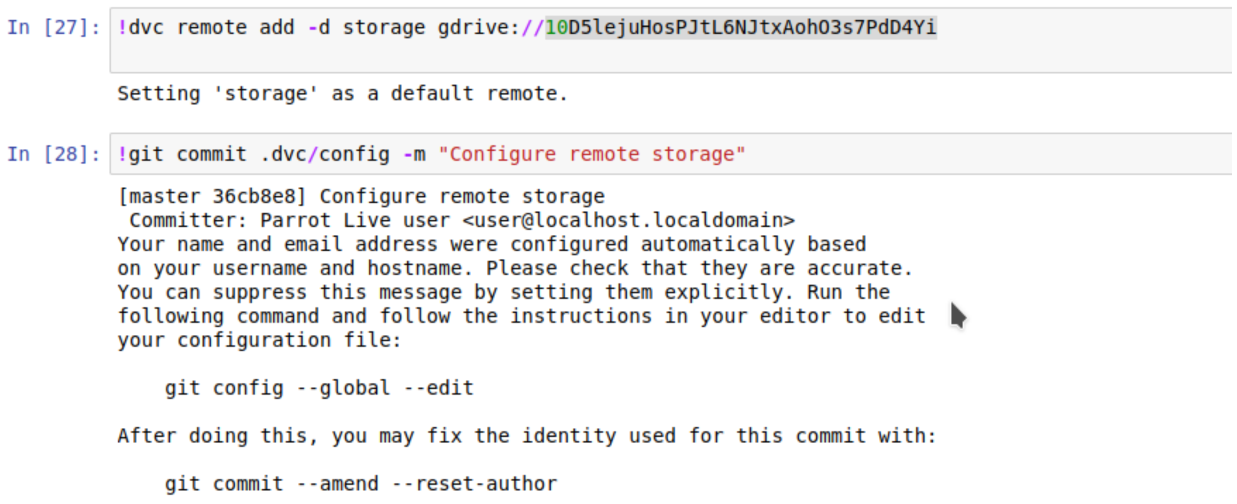
13. Add data to DVC



```
In [15]: !dvc add data/data.csv
```

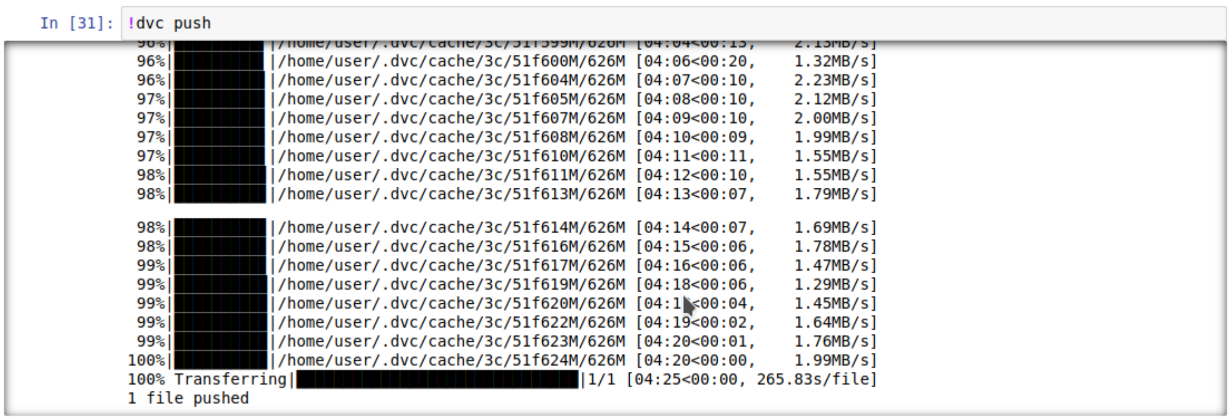
```
                                                              ⠋ Checking graph
Adding...
!
  0% Checking cache in '/home/user/.dvc/cache'|      |0/? [00:00<?,    ?files/s]

!
  0%|          |Transferring                           0/? [00:00<?,     ?file/s]
  0%|          |Transferring                           0/1 [00:00<?,     ?file/s]

!
  0%|          |Checking out data/data.csv             0/? [00:00<?,    ?files/s]
  0%|          |Checking out data/data.csv             0/1 [00:00<?,    ?files/s]
100%|██████████|Checking out data/data.csv        1/1 [00:01<00:00,  1.33s/files]
100% Adding...|████████████████████████████████████████|1/1 [00:05,  5.98s/file]

To track the changes with git, run:

        git add data/.gitignore data/data.csv.dvc

To enable auto staging, run:

        dvc config core.autostage true
```

14. Setting up remote storage



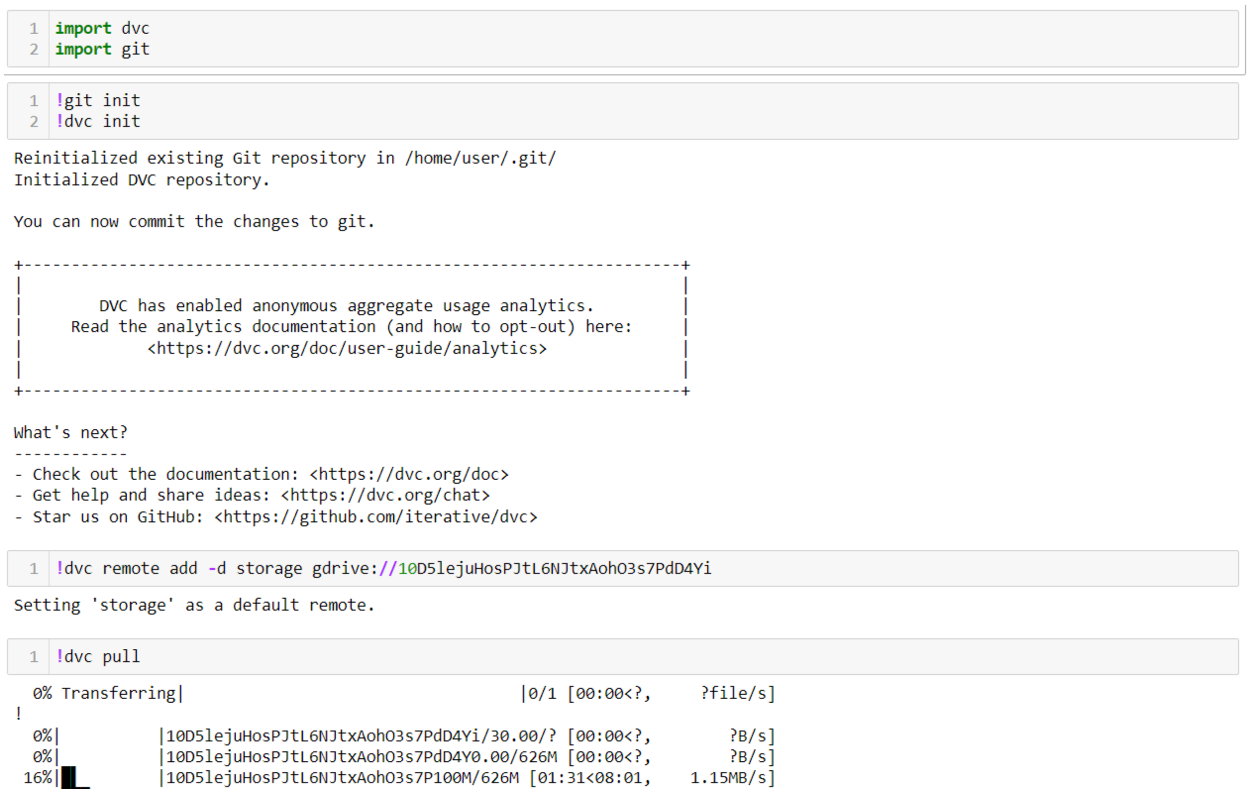
```
In [27]: !dvc remote add -d storage gdrive://10D5lejuHosPJtL6NJtxAohO3s7PdD4Yi

         Setting 'storage' as a default remote.

In [28]: !git commit .dvc/config -m "Configure remote storage"

         [master 36cb8e8] Configure remote storage
          Committer: Parrot Live user <user@localhost.localdomain>
         Your name and email address were configured automatically based
         on your username and hostname. Please check that they are accurate.
         You can suppress this message by setting them explicitly. Run the
         following command and follow the instructions in your editor to edit
         your configuration file:

             git config --global --edit

         After doing this, you may fix the identity used for this commit with:

             git commit --amend --reset-author
```

15. Pushing data to remote storage



```
In [31]: !dvc push
    96%|█████████|/home/user/.dvc/cache/3c/51f599M/626M [04:04<00:13,    2.13MB/s]
    96%|█████████|/home/user/.dvc/cache/3c/51f600M/626M [04:06<00:20,    1.32MB/s]
    96%|█████████|/home/user/.dvc/cache/3c/51f604M/626M [04:07<00:10,    2.23MB/s]
    97%|█████████|/home/user/.dvc/cache/3c/51f605M/626M [04:08<00:10,    2.12MB/s]
    97%|█████████|/home/user/.dvc/cache/3c/51f607M/626M [04:09<00:10,    2.00MB/s]
    97%|█████████|/home/user/.dvc/cache/3c/51f608M/626M [04:10<00:09,    1.99MB/s]
    97%|█████████|/home/user/.dvc/cache/3c/51f610M/626M [04:11<00:11,    1.55MB/s]
    98%|█████████|/home/user/.dvc/cache/3c/51f611M/626M [04:12<00:10,    1.55MB/s]
    98%|█████████|/home/user/.dvc/cache/3c/51f613M/626M [04:13<00:07,    1.79MB/s]

    98%|█████████|/home/user/.dvc/cache/3c/51f614M/626M [04:14<00:07,    1.69MB/s]
    98%|█████████|/home/user/.dvc/cache/3c/51f616M/626M [04:15<00:06,    1.78MB/s]
    99%|█████████|/home/user/.dvc/cache/3c/51f617M/626M [04:16<00:06,    1.47MB/s]
    99%|█████████|/home/user/.dvc/cache/3c/51f619M/626M [04:18<00:06,    1.29MB/s]
    99%|█████████|/home/user/.dvc/cache/3c/51f620M/626M [04:1[illegible]<00:04,    1.45MB/s]
    99%|█████████|/home/user/.dvc/cache/3c/51f622M/626M [04:19<00:02,    1.64MB/s]
    99%|█████████|/home/user/.dvc/cache/3c/51f623M/626M [04:20<00:01,    1.76MB/s]
   100%|█████████|/home/user/.dvc/cache/3c/51f624M/626M [04:20<00:00,    1.99MB/s]
   100% Transferring|██████████████████████████████|1/1 [04:25<00:00, 265.83s/file]
   1 file pushed
```

16. Pulling dataset from DVC:



```
import dvc
import git
```

```
!git init
!dvc init
```

```
Reinitialized existing Git repository in /home/user/.git/
Initialized DVC repository.

You can now commit the changes to git.

+---------------------------------------------------------------------+
|                                                                     |
|        DVC has enabled anonymous aggregate usage analytics.         |
|     Read the analytics documentation (and how to opt-out) here:     |
|             <https://dvc.org/doc/user-guide/analytics>              |
|                                                                     |
+---------------------------------------------------------------------+

What's next?
------------
- Check out the documentation: <https://dvc.org/doc>
- Get help and share ideas: <https://dvc.org/chat>
- Star us on GitHub: <https://github.com/iterative/dvc>
```

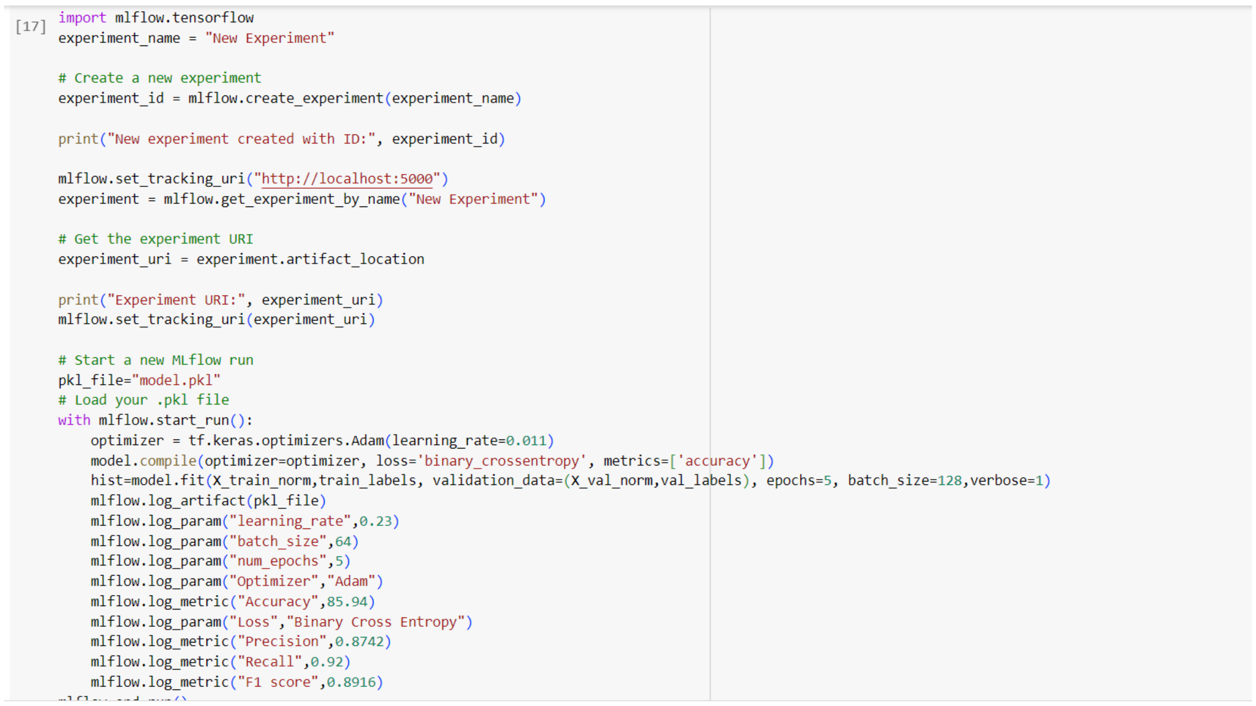
```
!dvc remote add -d storage gdrive://10D5lejuHosPJtL6NJtxAohO3s7PdD4Yi
```

```
Setting 'storage' as a default remote.
```

```
!dvc pull
```

```
  0% Transferring|                                    |0/1 [00:00<?,     ?file/s]
!
  0%|          |10D5lejuHosPJtL6NJtxAohO3s7PdD4Yi/30.00/? [00:00<?,        ?B/s]
  0%|          |10D5lejuHosPJtL6NJtxAohO3s7PdD4Y0.00/626M [00:00<?,        ?B/s]
 16%|█▏        |10D5lejuHosPJtL6NJtxAohO3s7P100M/626M [01:31<08:01,    1.15MB/s]
```

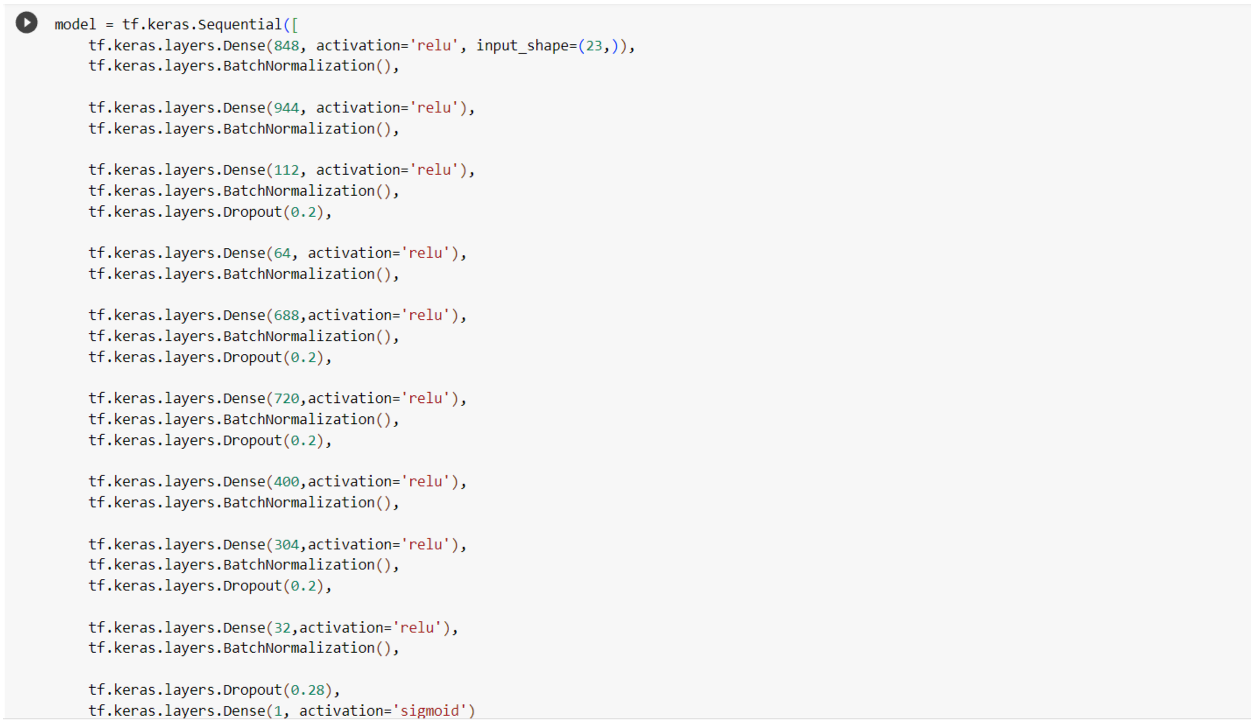
17. Setting up MLFlow and integrating it with Custom ML model:



```
[17]
import mlflow.tensorflow
experiment_name = "New Experiment"

# Create a new experiment
experiment_id = mlflow.create_experiment(experiment_name)

print("New experiment created with ID:", experiment_id)

mlflow.set_tracking_uri("http://localhost:5000")
experiment = mlflow.get_experiment_by_name("New Experiment")

# Get the experiment URI
experiment_uri = experiment.artifact_location

print("Experiment URI:", experiment_uri)
mlflow.set_tracking_uri(experiment_uri)

# Start a new MLflow run
pkl_file="model.pkl"
# Load your .pkl file
with mlflow.start_run():
    optimizer = tf.keras.optimizers.Adam(learning_rate=0.011)
    model.compile(optimizer=optimizer, loss='binary_crossentropy', metrics=['accuracy'])
    hist=model.fit(X_train_norm,train_labels, validation_data=(X_val_norm,val_labels), epochs=5, batch_size=128,verbose=1)
    mlflow.log_artifact(pkl_file)
    mlflow.log_param("learning_rate",0.23)
    mlflow.log_param("batch_size",64)
    mlflow.log_param("num_epochs",5)
    mlflow.log_param("Optimizer","Adam")
    mlflow.log_metric("Accuracy",85.94)
    mlflow.log_param("Loss","Binary Cross Entropy")
    mlflow.log_metric("Precision",0.8742)
    mlflow.log_metric("Recall",0.92)
    mlflow.log_metric("F1 score",0.8916)
```

The above snippet contains the basic workflow of MLFlow, in which we log the model's parameters i.e Learning rate, Batch Size, Optimizer and the metrics i.e Accuracy, Precision, Recall and F1-score. We train the model, which is a Sequential (Custom) model for our FYP, and then we carry 2 different experiments on the same model and demonstrate our findings using MLFLOW UI.

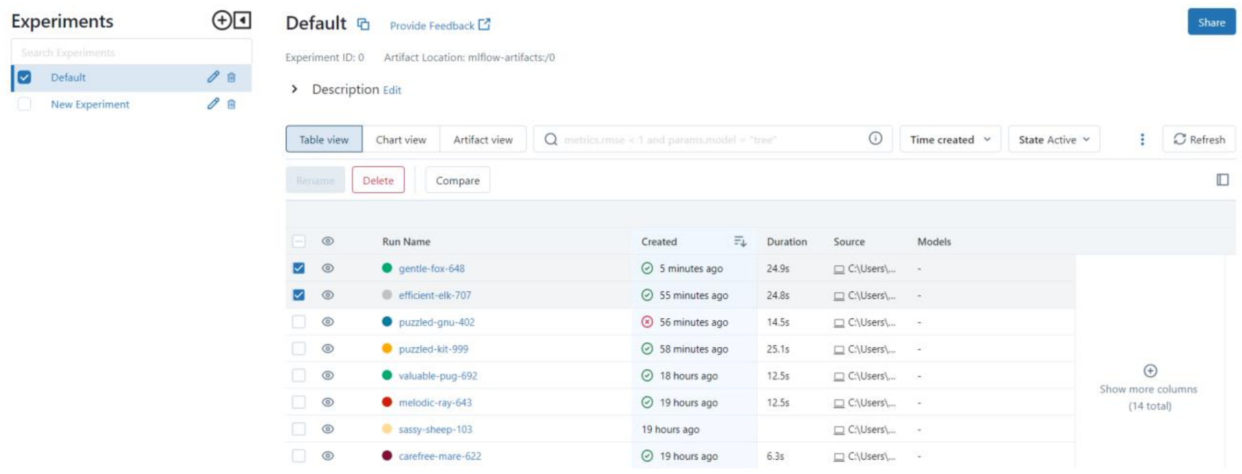
18. Model Architecture:



```
model = tf.keras.Sequential([
    tf.keras.layers.Dense(848, activation='relu', input_shape=(23,)),
    tf.keras.layers.BatchNormalization(),

    tf.keras.layers.Dense(944, activation='relu'),
    tf.keras.layers.BatchNormalization(),

    tf.keras.layers.Dense(112, activation='relu'),
    tf.keras.layers.BatchNormalization(),
    tf.keras.layers.Dropout(0.2),

    tf.keras.layers.Dense(64, activation='relu'),
    tf.keras.layers.BatchNormalization(),

    tf.keras.layers.Dense(688,activation='relu'),
    tf.keras.layers.BatchNormalization(),
    tf.keras.layers.Dropout(0.2),

    tf.keras.layers.Dense(720,activation='relu'),
    tf.keras.layers.BatchNormalization(),
    tf.keras.layers.Dropout(0.2),

    tf.keras.layers.Dense(400,activation='relu'),
    tf.keras.layers.BatchNormalization(),

    tf.keras.layers.Dense(304,activation='relu'),
    tf.keras.layers.BatchNormalization(),
    tf.keras.layers.Dropout(0.2),

    tf.keras.layers.Dense(32,activation='relu'),
    tf.keras.layers.BatchNormalization(),

    tf.keras.layers.Dropout(0.28),
    tf.keras.layers.Dense(1, activation='sigmoid')
```

The above snippet contains a 10 layered Fully Connected Network, for our FYP. The model has a training accuracy of 90.18% on 25 epochs, and a test accuracy of 90.72%

19. ML Flow Experiments:



Default Provide Feedback

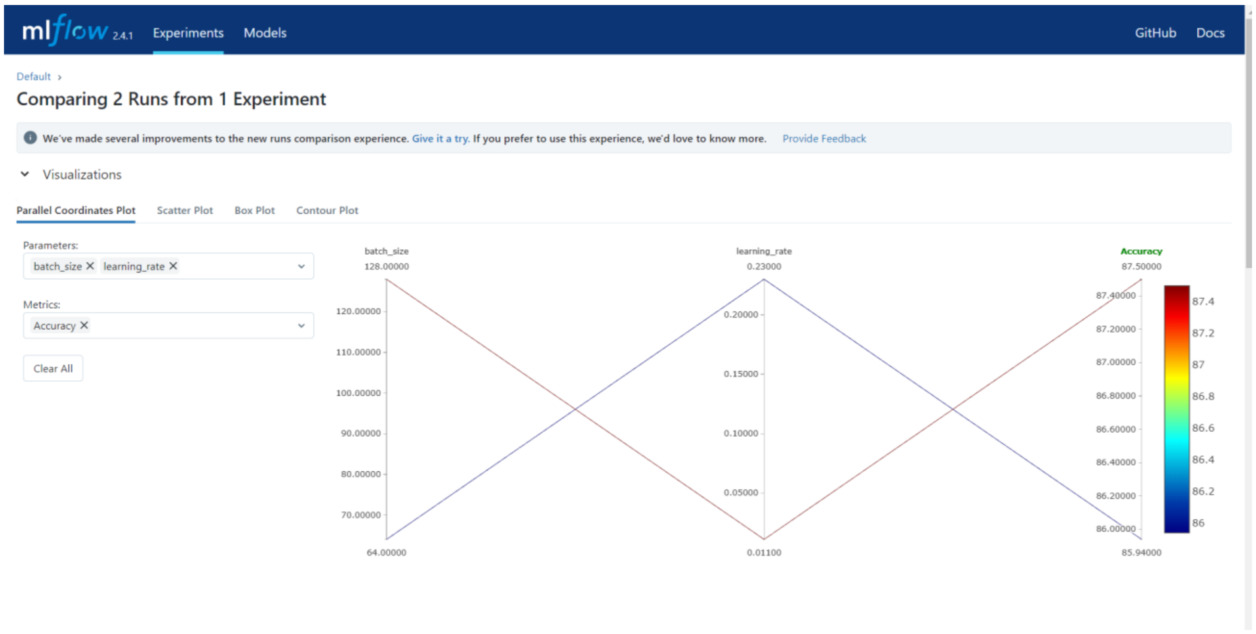
Experiment ID: 0 Artifact Location: mlflow-artifacts:/0

Description Edit

	Run Name	Created	Duration	Source	Models
✓	gentle-fox-648	5 minutes ago	24.9s	C:\Users\...	-
✓	efficient-elk-707	55 minutes ago	24.8s	C:\Users\...	-
	puzzled-gnu-402	56 minutes ago	14.5s	C:\Users\...	-
	puzzled-kit-999	58 minutes ago	25.1s	C:\Users\...	-
	valuable-pug-692	18 hours ago	12.5s	C:\Users\...	-
	melodic-ray-643	19 hours ago	12.5s	C:\Users\...	-
	sassy-sheep-103	19 hours ago		C:\Users\...	-
	carefree-mare-622	19 hours ago	6.3s	C:\Users\...	-

We carried 2 experiments, on the same model while slightly adjusting the model's trainable parameters, to gain a valuable change in accuracy and vice versa. The two checkboxes in the above snippet represent 2 different runs on the same experiment.

20. Experiments Analysis:



Default ›

Comparing 2 Runs from 1 Experiment

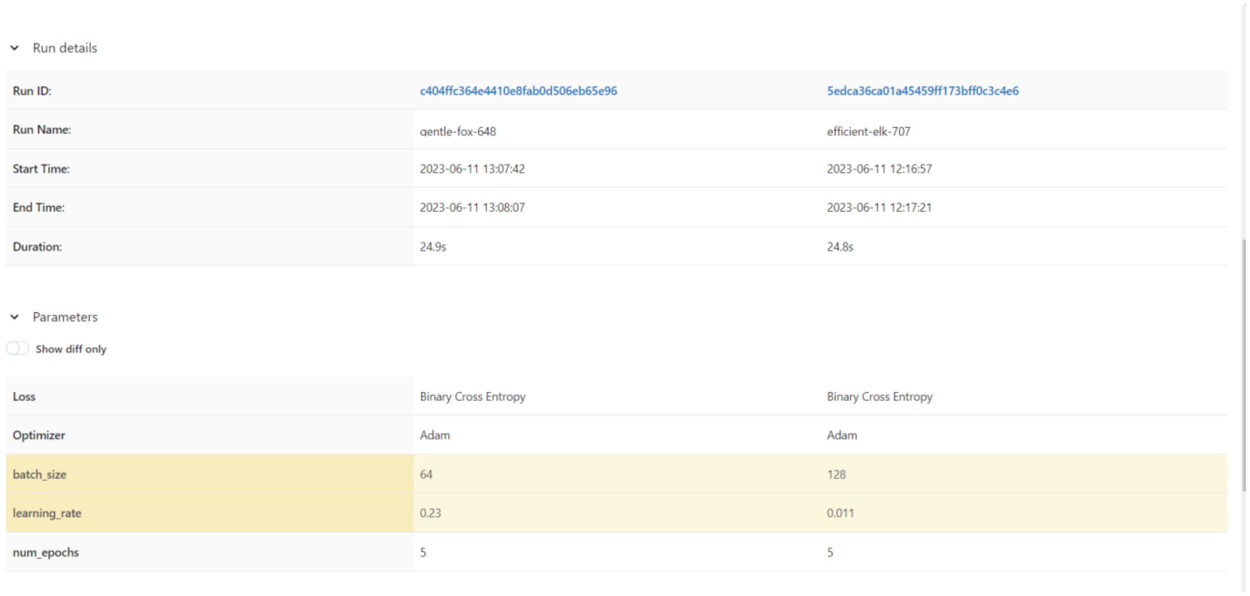
We've made several improvements to the new runs comparison experience. Give it a try. If you prefer to use this experience, we'd love to know more. Provide Feedback

Parameters: batch_size, learning_rate

Metrics: Accuracy

The scrutiny of the experiments is signified by a change in accuracy, while the precision, Recall and F1 score remains unaffected.

21. Experiment Comparison:



Run details

Run ID:	c404ffc364e4410e8fab0d506eb65e96	5edca36ca01a45459ff173bff0c3c4e6
Run Name:	gentle-fox-648	efficient-elk-707
Start Time:	2023-06-11 13:07:42	2023-06-11 12:16:57
End Time:	2023-06-11 13:08:07	2023-06-11 12:17:21
Duration:	24.9s	24.8s

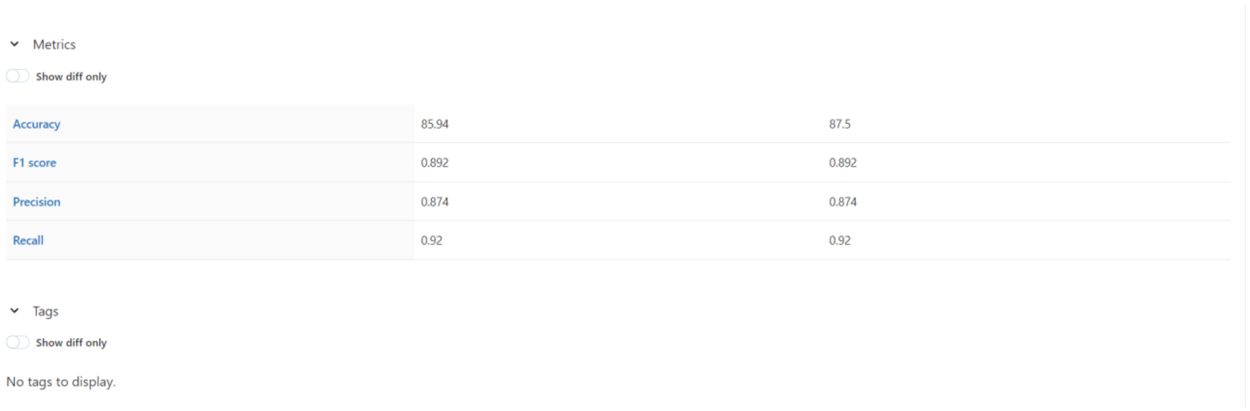
Parameters

Show diff only

Loss	Binary Cross Entropy	Binary Cross Entropy
Optimizer	Adam	Adam
batch_size	64	128
learning_rate	0.23	0.011
num_epochs	5	5

The above snippet contains a detailed comparison of the model's trainable parameters for 2 distinct and successful runs. He simply tweaked the model's learning rate and batch size to see if it has any co-variation with the accuracy or not.

22. Further details:



Metrics

Show diff only

Accuracy	85.94	87.5
F1 score	0.892	0.892
Precision	0.874	0.874
Recall	0.92	0.92

Tags

Show diff only

No tags to display.

As we can see, the accuracy plummets by ~2%, when the batch size and learning rate is altered, which denotes that the ideal batch size should be 128 and the learning rate should remain unchanged.