I worked with

Muhammad Asim(2211-016-KHI-DEG)

Muhammad Adnan (2211-014-KHI-DEG)

Muhammad Daniyal (2211-017-KHI-DEG)

Muhammad Mudassir Raza(2211-021-KHI-DEG)

In [17]:
```
!python -c "import sys; print(sys.executable)"
```

```
/bin/bash: line 1: python: command not found
```

In [18]:
```
import pandas as pd
from sklearn.metrics import f1_score
```

In [23]:
```
%%bash --bg

mlflow server --host 0.0.0.0 \
    --port 5000 \
    --backend-store-uri sqlite:///mlflow.db \
    --default-artifact-root ./mlruns
```

In [24]:
```
%cat MLproject
```

```
name: basic_mlflow

# this file is used to configure Python package dependencies.
# it uses Anaconda, but it can be also alternatively configured to use pip.
conda_env: conda.yaml

# entry points can be ran using `mlflow run <project_name> -e <entry_point_name>
entry_points:
  download_data:
    # you can run any command using MLFlow
    command: "bash download_data.sh"
  # MLproject file has to have main entry_point. It can be toggled without using -e option.
  main:
    # parameters is a key-value collection.
    parameters:
      max_k:
        type: int
        default: 10
    command: "python train_1.py {max_k}"
```

In [21]:
```
import sklearn
```

In [25]:

```
%%bash
source mlflow_env_vars.sh
mlflow run .
```

```
2022/12/16 18:28:08 INFO mlflow.utils.conda: Conda environment mlflow-dd0fbdd40ba98798131458f29496394bd1a3fb33 already exists.
2022/12/16 18:28:08 INFO mlflow.projects.utils: === Created directory /tmp/tmpb9dx18y1 for downloading remote URIs passed to arguments of type
'path' ===
2022/12/16 18:28:08 INFO mlflow.projects.backend.local: === Running command 'source /home/muhammadhumza/anaconda3/bin/../etc/profile.d/conda.s
h && conda activate mlflow-dd0fbdd40ba98798131458f29496394bd1a3fb33 1>&2 && python train_1.py 10' in run with ID '26eefae5964f40f6b531d84327cf
eb23' ===
/home/muhammadhumza/anaconda3/envs/mlflow-dd0fbdd40ba98798131458f29496394bd1a3fb33/lib/python3.10/site-packages/_distutils_hack/__init__.py:3
3: UserWarning: Setuptools is replacing distutils.
  warnings.warn("Setuptools is replacing distutils.")
Registered model 'sklearn_knn1' already exists. Creating a new version of this model...
2022/12/16 18:28:10 INFO mlflow.tracking._model_registry.client: Waiting up to 300 seconds for model version to finish creation.
Model name: sklearn_knn1, version 28
Created version '28' of model 'sklearn_knn1'.
Registered model 'sklearn_knn1' already exists. Creating a new version of this model...
2022/12/16 18:28:11 INFO mlflow.tracking._model_registry.client: Waiting up to 300 seconds for model version to finish creation.
Model name: sklearn_knn1, version 29
Created version '29' of model 'sklearn_knn1'.
Registered model 'sklearn_knn1' already exists. Creating a new version of this model...
2022/12/16 18:28:12 INFO mlflow.tracking._model_registry.client: Waiting up to 300 seconds for model version to finish creation.
Model name: sklearn_knn1, version 30
Created version '30' of model 'sklearn_knn1'.
Registered model 'sklearn_knn1' already exists. Creating a new version of this model...
2022/12/16 18:28:13 INFO mlflow.tracking._model_registry.client: Waiting up to 300 seconds for model version to finish creation.
Model name: sklearn_knn1, version 31
Created version '31' of model 'sklearn_knn1'.
Registered model 'sklearn_knn1' already exists. Creating a new version of this model...
2022/12/16 18:28:14 INFO mlflow.tracking._model_registry.client: Waiting up to 300 seconds for model version to finish creation.
Model name: sklearn_knn1, version 32
Created version '32' of model 'sklearn_knn1'.
Registered model 'sklearn_knn1' already exists. Creating a new version of this model...
2022/12/16 18:28:15 INFO mlflow.tracking._model_registry.client: Waiting up to 300 seconds for model version to finish creation.
Model name: sklearn_knn1, version 33
Created version '33' of model 'sklearn_knn1'.
Registered model 'sklearn_knn1' already exists. Creating a new version of this model...
2022/12/16 18:28:16 INFO mlflow.tracking._model_registry.client: Waiting up to 300 seconds for model version to finish creation.
Model name: sklearn_knn1, version 34
Created version '34' of model 'sklearn_knn1'.
Registered model 'sklearn_knn1' already exists. Creating a new version of this model...
2022/12/16 18:28:17 INFO mlflow.tracking._model_registry.client: Waiting up to 300 seconds for model version to finish creation.
Model name: sklearn_knn1, version 35
Created version '35' of model 'sklearn_knn1'.
Registered model 'sklearn_knn1' already exists. Creating a new version of this model...
2022/12/16 18:28:18 INFO mlflow.tracking._model_registry.client: Waiting up to 300 seconds for model version to finish creation.
```

```
Model name: sklearn_knn1, version 36
Created version '36' of model 'sklearn_knn1'.
2022/12/16 18:28:19 INFO mlflow.projects: === Run (ID '26eefae5964f40f6b531d84327cfeb23') succeeded ===
```

In [26]:

```
%%bash
last_model_path=$(ls -tr mlruns/0/ | tail -1)
cat mlruns/0/$last_model_path/artifacts/knn/MLmodel
```

```
artifact_path: knn
flavors:
  python_function:
    env:
      conda: conda.yaml
      virtualenv: python_env.yaml
    loader_module: mlflow.sklearn
    model_path: model.pkl
    predict_fn: predict
    python_version: 3.10.8
  sklearn:
    code: null
    pickled_model: model.pkl
    serialization_format: cloudpickle
    sklearn_version: 1.2.0
mlflow_version: 2.0.1
model_uuid: f71f6c5ee7c04f2aa64b8956af10a947
run_id: b87e0e8f21e9498cb62848dc9cc5a75b
utc_time_created: '2022-12-16 13:28:17.852424'
```

In [27]:

```
import mlflow
```

In [28]:

```
%%bash --bg
source mlflow_env_vars.sh
mlflow --version
mlflow models serve -m models:/sklearn_knn1/Production -p 5005 --env-manager=conda
```

In [34]:

```
%%bash
data='[[-0.21377227,2.20102755,0.33852017,0.54045974,-1.06750181,
       -0.93797676,-1.40163347,0.83589485,-1.33602356,1.09645451,
       -1.83108938,-1.06504572,-0.39959595]]'
echo $data

curl -d "{\"inputs\": $data}" -H 'Content-Type: application/json' 127.0.0.1:5005/invocations
```

```
[[-0.21377227,2.20102755,0.33852017,0.54045974,-1.06750181, -0.93797676,-1.40163347,0.83589485,-1.33602356,1.09645451, -1.83108938,-1.0650457
2,-0.39959595]]

  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100   202  100    20  100   182   6587  59947 --:--:-- --:--:-- --:--:--   98k

{"predictions": [2]}
```

In [33]:

```
%%bash
data='[[ 0.72448181, -0.60307486, -0.22543808, -0.9847936 ,  1.2832654 ,
         1.42866829,  1.31116442, -0.25020148,  1.29154193,  0.43699675,
         0.00314921,  1.0764175 ,  0.23036358]]'
echo $data

curl -d "{\"inputs\": $data}" -H 'Content-Type: application/json' 127.0.0.1:5005/invocations
```

```
[[ 0.72448181, -0.60307486, -0.22543808, -0.9847936 , 1.2832654 , 1.42866829, 1.31116442, -0.25020148, 1.29154193, 0.43699675, 0.00314921, 1.0
764175 , 0.23036358]]

  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100   217  100    20  100   197  10970   105k --:--:-- --:--:-- --:--:--  211k

{"predictions": [0]}
```

In [32]:

```
!netstat -tnlp | grep 5005
```

```
(Not all processes could be identified, non-owned process info
 will not be shown, you would have to be root to see it all.)
tcp        0      0 127.0.0.1:5005          0.0.0.0:*               LISTEN      43541/python
```

In [ ]:

```

```