



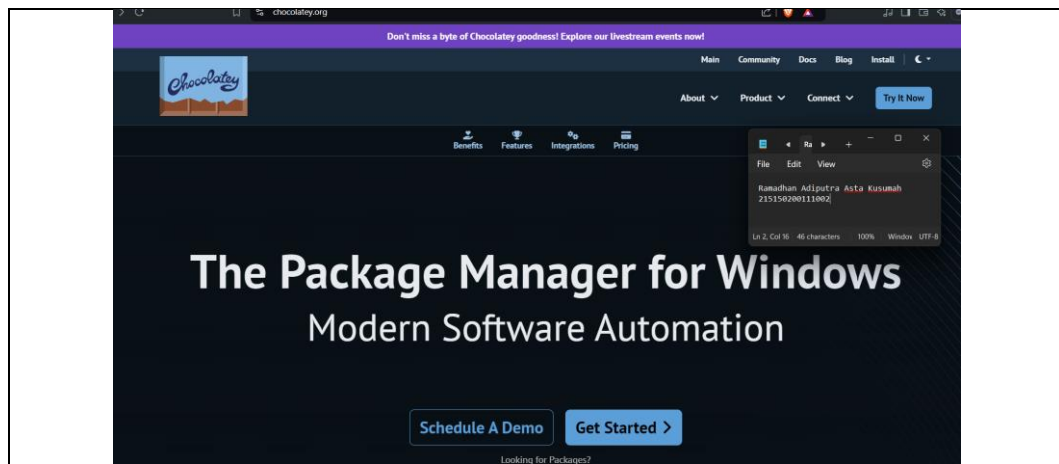
MACHINE LEARNING OPERATIONS
FAKULTAS ILMU KOMPUTER
UNIVERSITAS BRAWIJAYA

BAB : MAKEFILE
NAMA : RAMADHAN ADIPUTRA ASTA KUSUMAH
NIM : 215150200111002
TANGGAL : 05/09/2024

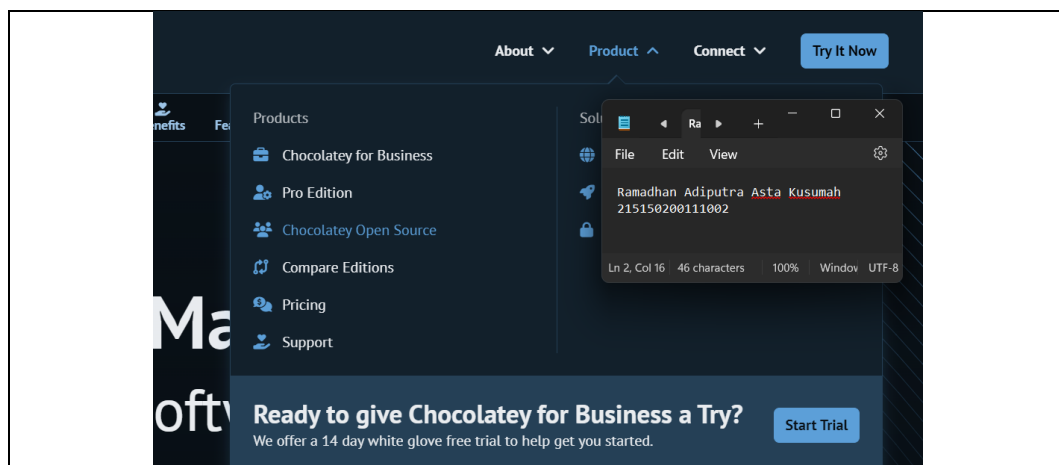
1.1 Instalasi Makefile

1. Instalasi *Chocolatey Package Manager*

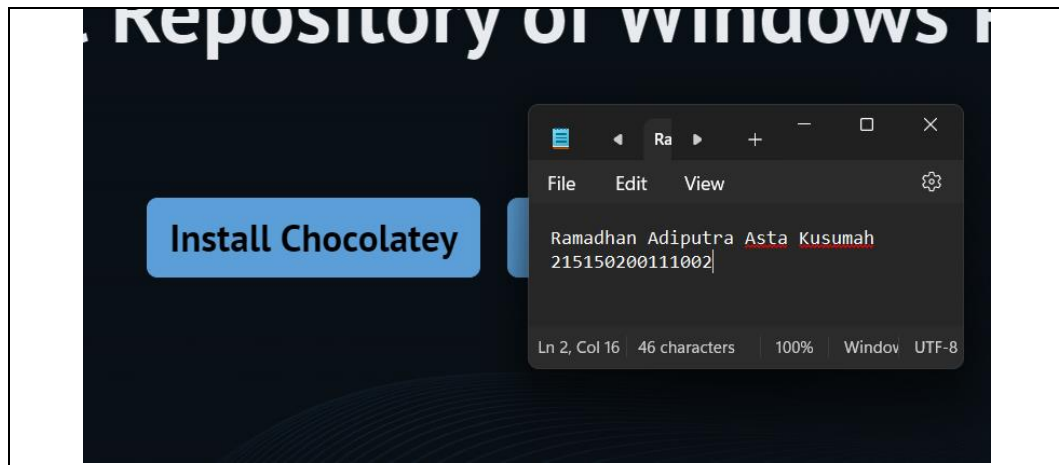
1. Buka Website resmi *Chocolatey*



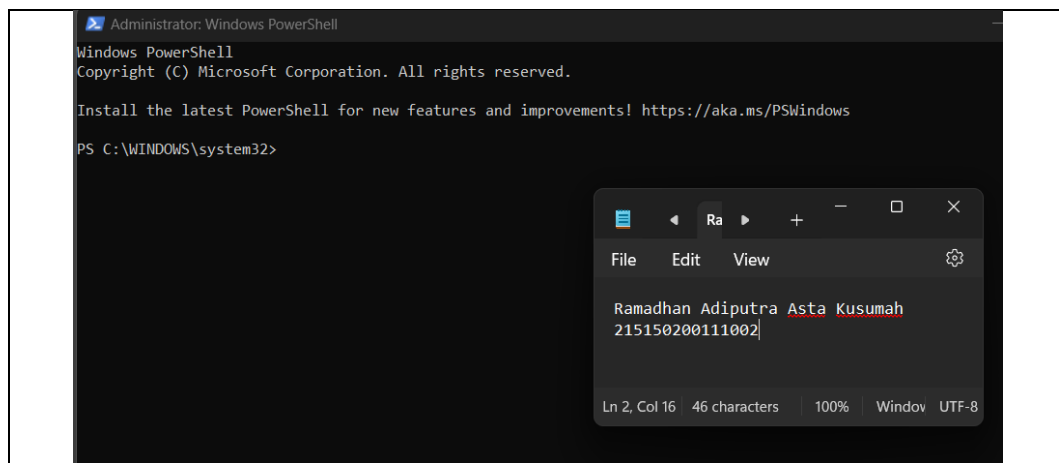
2. Klik *Product* dan *Chocolatey Open Source*



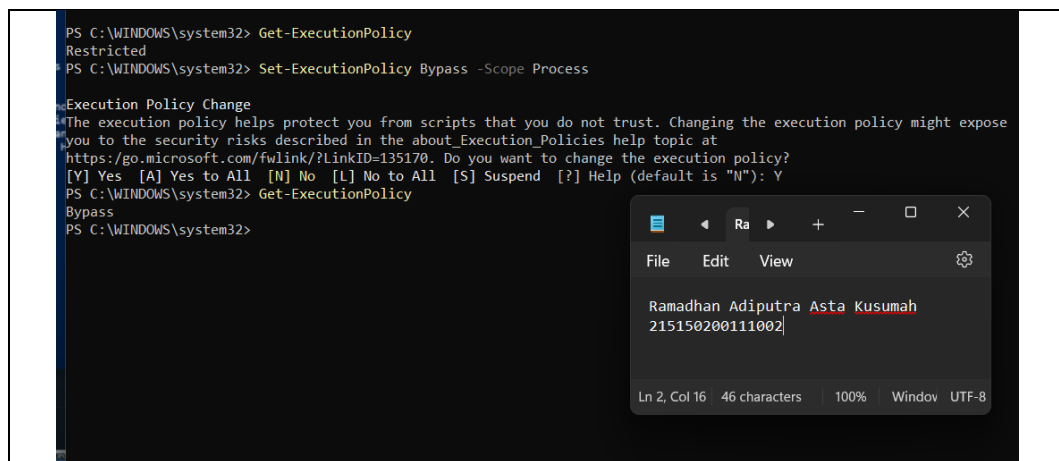
3. Klik *Install Chocolatey*



4. Mengikuti langkah instalasi dengan membuka PowerShell dengan akses administrator

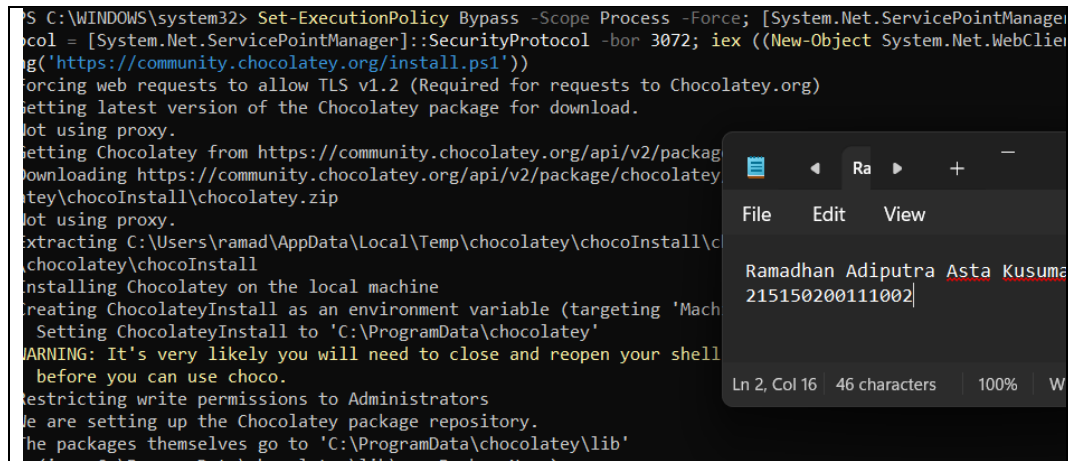


5. Cek *ExecutionPolicy* apabila *Restricted* ubah menjadi *Bypass*



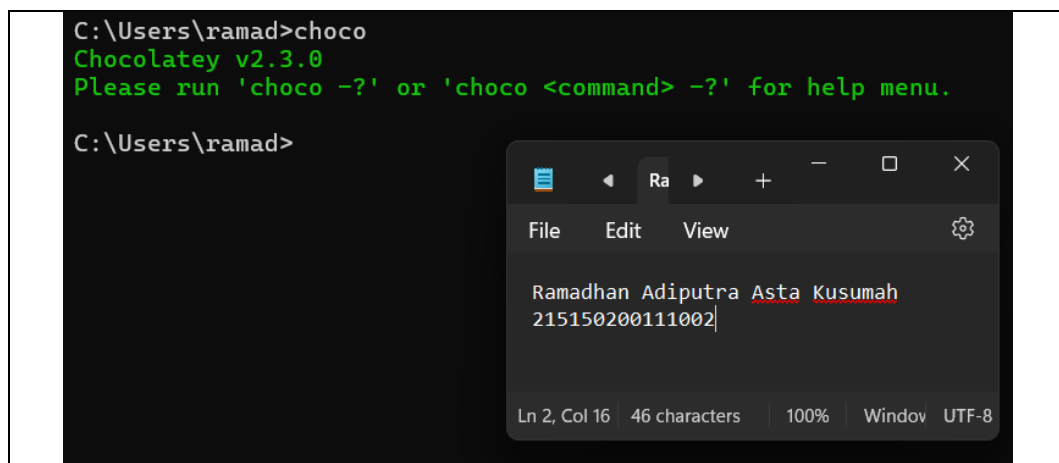
6. Jalankan *command* untuk install *Chocolatey*

```
Set-ExecutionPolicy Bypass -Scope Process -Force; [System.Net.ServicePointManager]::SecurityProtocol = [System.Net.ServicePointManager]::SecurityProtocol -bor 3072; iex ((New-Object System.Net.WebClient).DownloadString('https://community.chocolatey.org/install.ps1'))
```



```
S C:\WINDOWS\system32> Set-ExecutionPolicy Bypass -Scope Process -Force; [System.Net.ServicePointManager]::SecurityProtocol = [System.Net.ServicePointManager]::SecurityProtocol -bor 3072; iex ((New-Object System.Net.WebClient).DownloadString('https://community.chocolatey.org/install.ps1'))
forcing web requests to allow TLS v1.2 (Required for requests to Chocolatey.org)
getting latest version of the Chocolatey package for download.
not using proxy.
getting Chocolatey from https://community.chocolatey.org/api/v2/package/chocolatey
downloading https://community.chocolatey.org/api/v2/package/chocolatey
C:\Users\ramad\AppData\Local\Temp\chocolatey\chocoInstall\chocolatey.zip
not using proxy.
extracting C:\Users\ramad\AppData\Local\Temp\chocolatey\chocoInstall\chocolatey\chocoInstall
installing Chocolatey on the local machine
creating ChocolateyInstall as an environment variable (targeting 'Machine')
Setting ChocolateyInstall to 'C:\ProgramData\chocolatey'
WARNING: It's very likely you will need to close and reopen your shell
before you can use choco.
restricting write permissions to Administrators
we are setting up the Chocolatey package repository.
the packages themselves go to 'C:\ProgramData\chocolatey\lib'
```

7. *Chocolatey* sudah bisa digunakan

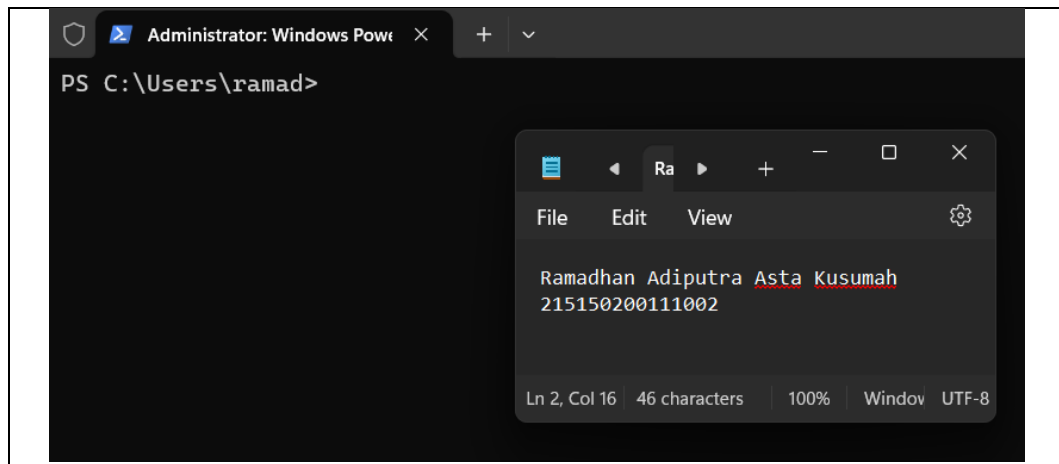


```
C:\Users\ramad>choco
Chocolatey v2.3.0
Please run 'choco -?' or 'choco <command> -?' for help menu.

C:\Users\ramad>
```

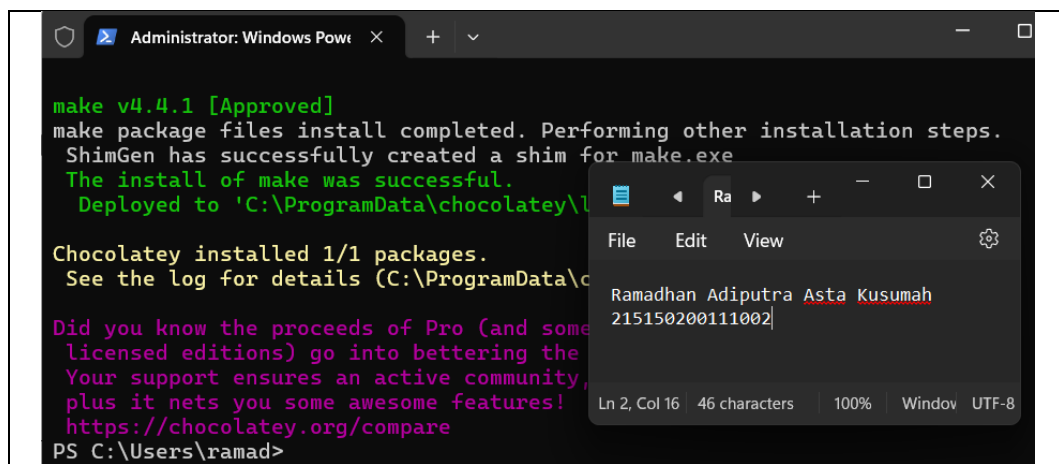
2. Instalasi *Make*

8. Buka aplikasi Terminal dengan akses administrator

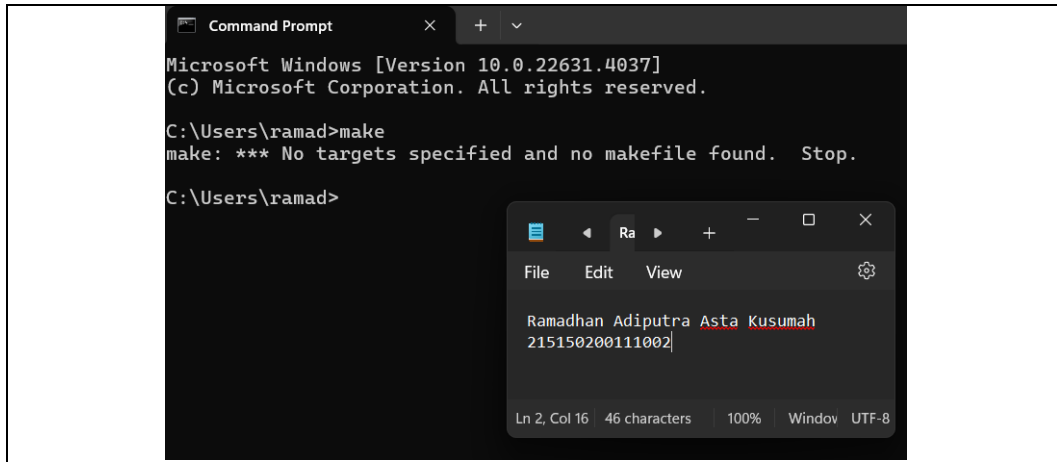


9. Jalankan *command*

`choco install make`



10. *Make* sudah bisa digunakan



```
Microsoft Windows [Version 10.0.22631.4037]
(c) Microsoft Corporation. All rights reserved.

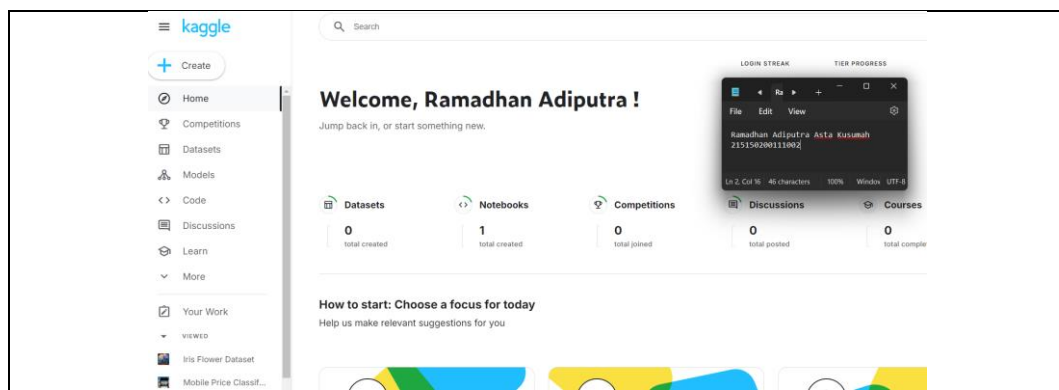
C:\Users\ramad>make
make: *** No targets specified and no makefile found. Stop.

C:\Users\ramad>
```

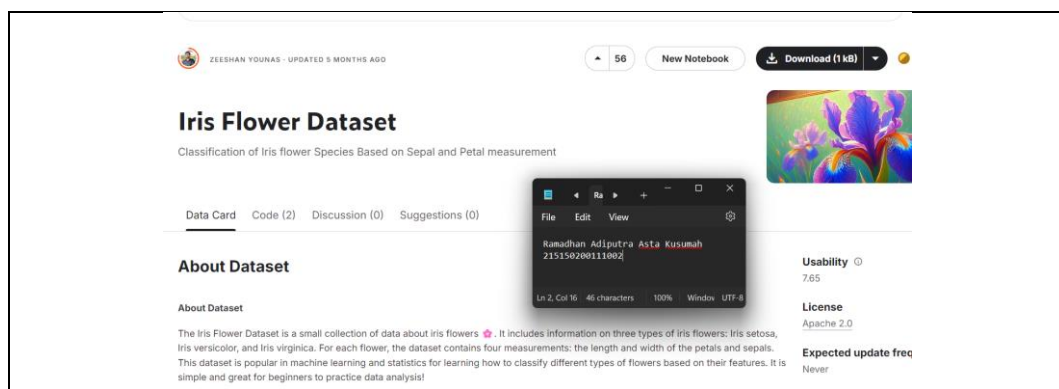
Ramadhan Adiputra Asta Kusumah
215150200111002

1.2 Download dataset Iris

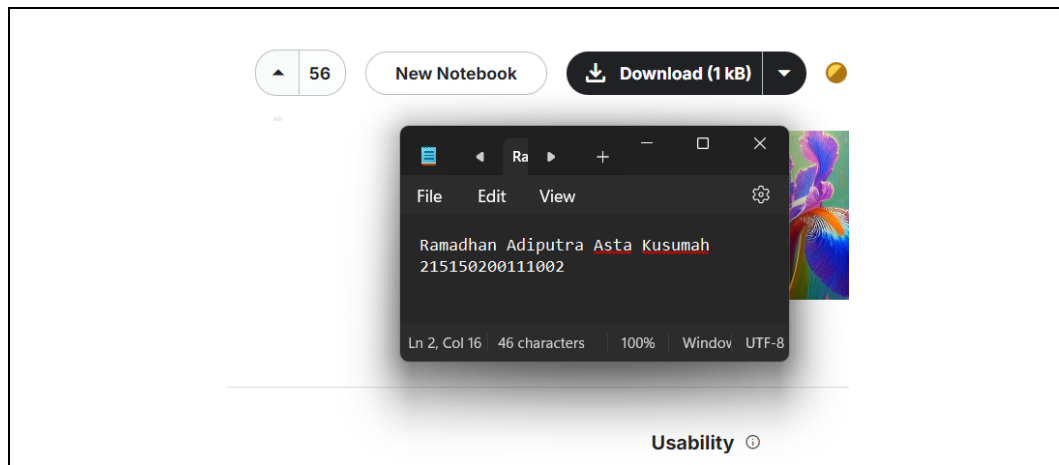
1. Buka kaggle



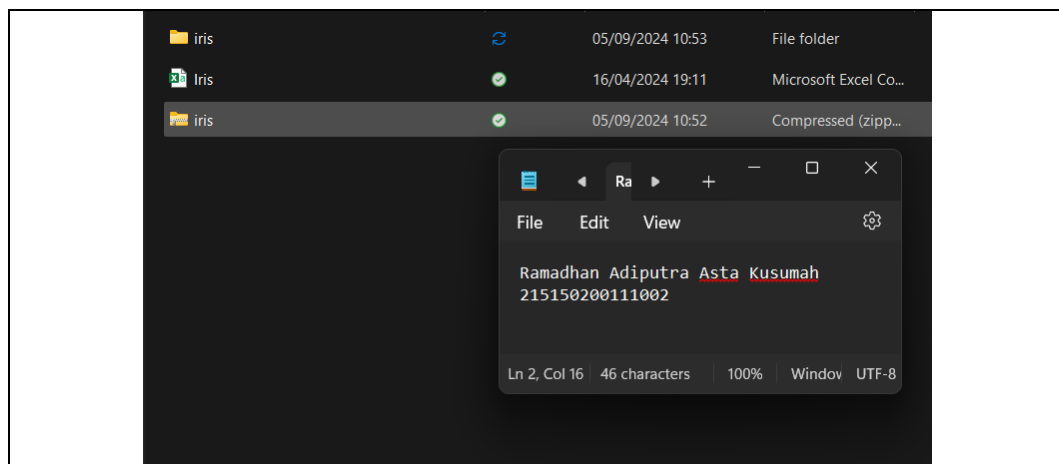
2. Cari dataset bernama *Iris Flower Dataset*



3. Klik *Download*



4. Unzip dataset dan tempatkan di folder data



1.3 Scripting Python dan Makefile

1. Python *script* untuk persiapan data

```
import pandas as pd
import sklearn
from sklearn.model_selection import train_test_split
import joblib

def prepare_data():
    file_path = 'data/iris.csv'
    df = pd.read_csv(file_path)

    feature_names = [col for col in df.columns if col !=
'Species']
```

```

target_name = 'Species'

X = df[feature_names]
y = df[target_name]

y = pd.Categorical(y).codes

X_train, X_test, y_train, y_test = train_test_split(
    X, y, test_size=0.3, random_state=42
)

joblib.dump((X_train, y_train), 'data/X_train.pkl')
joblib.dump((X_test, y_test), 'data/X_test.pkl')
print("Data preparation complete and data saved to
disk.")

if __name__ == "__main__":
    prepare_data()

```

2. Python *script* untuk melatih model

```

from sklearn.linear_model import LogisticRegression
import joblib

def train_model():
    X_train, y_train = joblib.load('data/X_train.pkl')

    model = LogisticRegression(max_iter=200)
    model.fit(X_train, y_train)

    print("Model training complete.")

    return model

if __name__ == "__main__":
    train_model()

```

3. Python *script* untuk evaluasi model

```

from sklearn.metrics import classification_report
import joblib
from train_model import train_model

```

```
def evaluate_model():
    model = train_model()
    X_test, y_test = joblib.load('data/X_test.pkl')
    y_pred = model.predict(X_test)

    report = classification_report(y_test, y_pred,
target_names=['setosa', 'versicolor', 'virginica'])

    print("Model Evaluation Report:")
    print(report)

if __name__ == "__main__":
    evaluate_model()
```

4. Python *script* untuk deploy model

```
import joblib
from train_model import train_model

def deploy_model():
    model = train_model()
    joblib.dump(model,
'models/logistic_regression_model.pkl')

if __name__ == "__main__":
    deploy_model()
```

5. *Makefile script* untuk otomasi

```
DATA_PREP_SCRIPT = scripts/data_prep.py
TRAIN_MODEL_SCRIPT = scripts/train_model.py
EVALUATE_MODEL_SCRIPT = scripts/evaluate_model.py
DEPLOY_MODEL_SCRIPT = scripts/deploy_model.py
REQUIREMENTS_FILE = requirements.txt

all: install data train evaluate deploy

install:
    @echo "Installing dependencies"
    pip install -r $(REQUIREMENTS_FILE)
```



```
data:
    @echo "Preparing data..."
    python $(DATA_PREP_SCRIPT)

train:
    @echo "Training model..."
    python $(TRAIN_MODEL_SCRIPT)

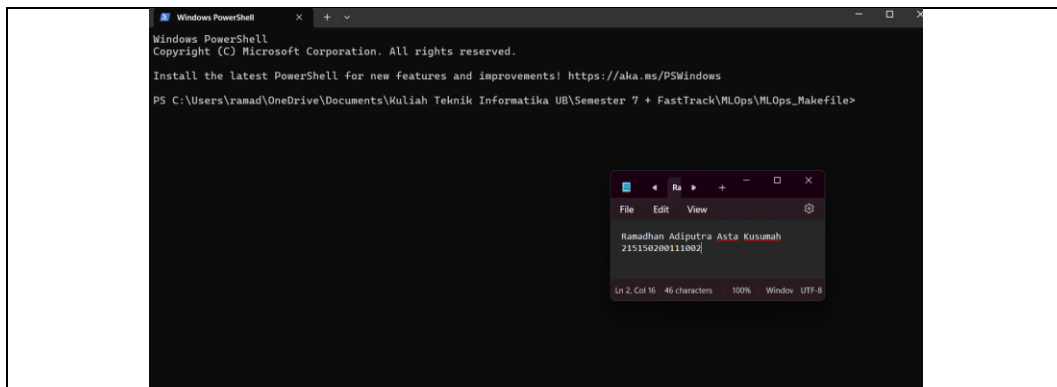
evaluate:
    @echo "Evaluating model..."
    python $(EVALUATE_MODEL_SCRIPT)

deploy:
    @echo "Deploying model..."
    python $(DEPLOY_MODEL_SCRIPT)

.PHONY: all install data train evaluate deploy clean
```

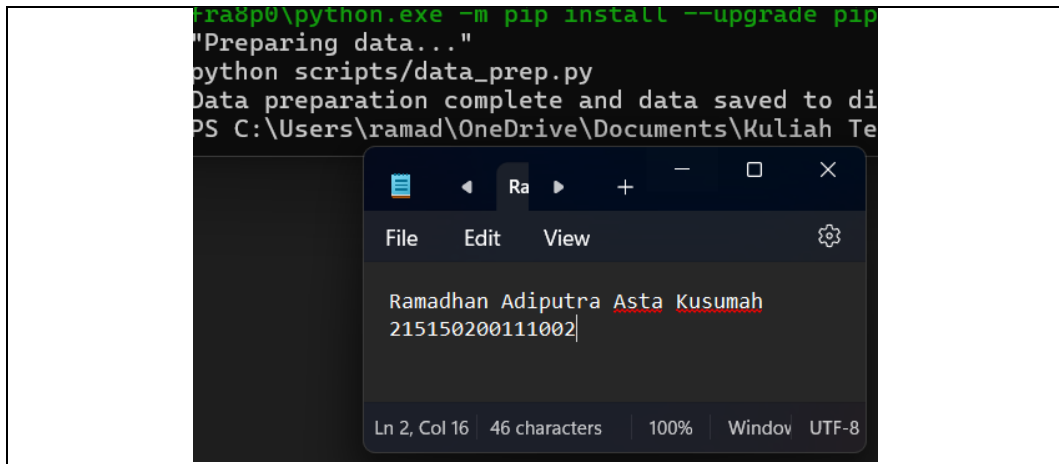
1.4 Running Make

1. Buka Terminal



2. Jalankan perintah

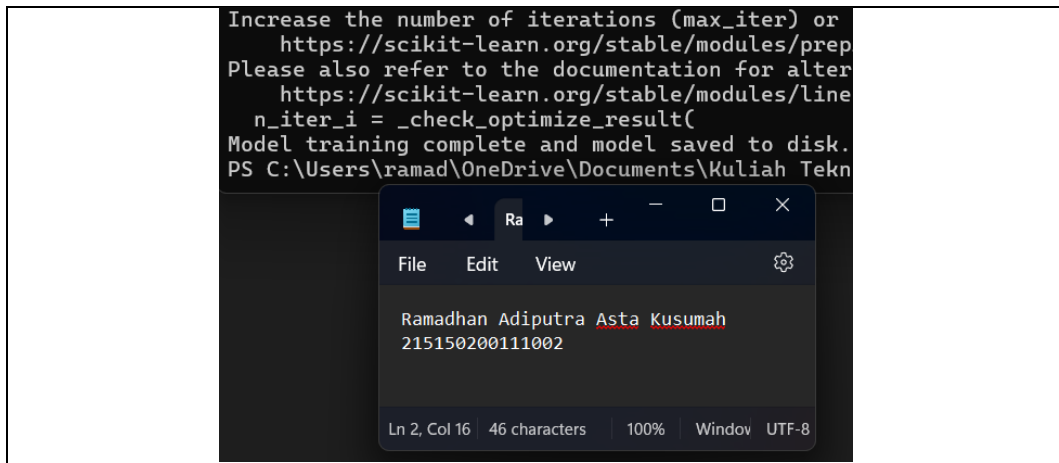
make data



```
fra8p0\python.exe -m pip install --upgrade pip
"Preparing data..."
python scripts/data_prep.py
Data preparation complete and data saved to disk.
PS C:\Users\ramad\OneDrive\Documents\Kuliah Te
```

3. Jalankan perintah

make train



```
Increase the number of iterations (max_iter) or
https://scikit-learn.org/stable/modules/prep
Please also refer to the documentation for alter
https://scikit-learn.org/stable/modules/line
n_iter_i = _check_optimize_result(
Model training complete and model saved to disk.
PS C:\Users\ramad\OneDrive\Documents\Kuliah Tekn
```

4. Jalankan perintah

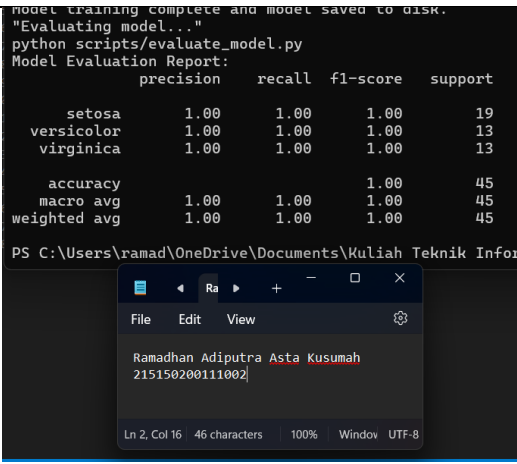
make evaluate

```
model training complete and model saved to disk.
"Evaluating model..."
python scripts/evaluate_model.py
Model Evaluation Report:
precision    recall  f1-score   support

   setosa      1.00      1.00      1.00        19
  versicolor  1.00      1.00      1.00        13
   virginica   1.00      1.00      1.00        13

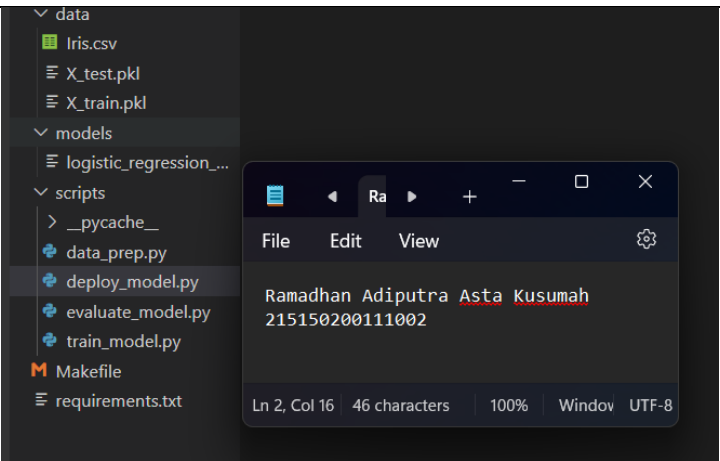
 accuracy      1.00      1.00      1.00        45
 macro avg     1.00      1.00      1.00        45
 weighted avg  1.00      1.00      1.00        45

PS C:\Users\ramad\OneDrive\Documents\Kuliah Teknik Infor
```



5. Jalankan perintah

make deploy



1.5 Laporan Akhir

1. Kendala dan penyelesaian dalam pembuatan tugas

No	Kendala	Solusi
1	Perlu instalasi package manager sebelum install make	Mengikuti tutorial di internet
2	Running make sempat error karena library python	Menambahkan requirements.txt dan mengunduhnya dengan command make install
3	Waktu yang terbatas	-

2. Link GitHub Jupyter Notebook

https://github.com/RamaAsta/MLOps_Makefile