Cloud and API deployment using Heroku

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Abstract

This project aims to deploy a Flask application to Heroku by hosting it on the internet in order to provide a public URL where anyone can view the work or product.

What is Heroku?

Heroku is a Platform as a service (PaaS), it lets us deploy, run and manage applications written in Ruby, Node.js, Java, Python, Clojure, Scala, Go and PHP.

In our case, the application is written in Python.

Steps of deployment:

1. **Prerequisites:**
2. **Delpoy the app on Heroku**
3. **Testing the app**

Let's start!

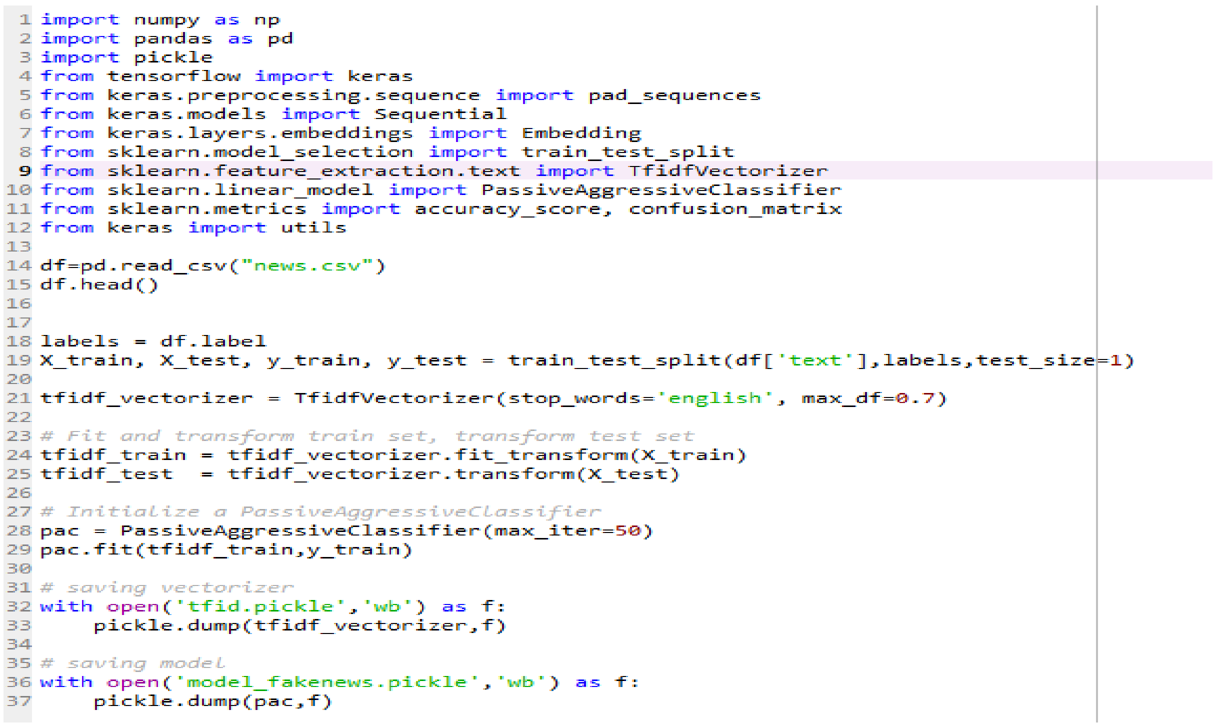
1. Prerequisites:

- Heroku account (on https://www.heroku.com/)
- Python installed

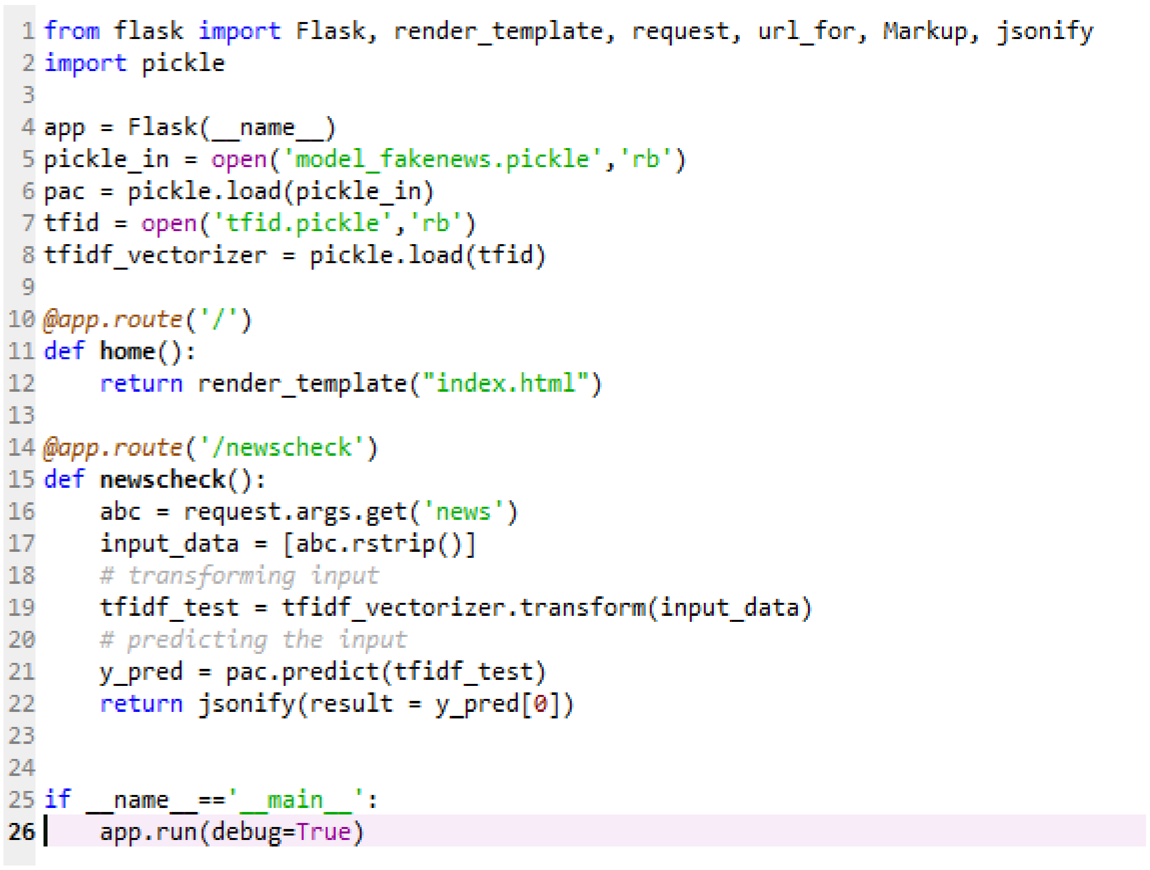
- GIT installed on local PC (on https://git-scm.com/downloads)
- A trained ML model developed in python (model used in Week4)

  - The shape of the dataset is 7796×3.
  - We built a **TfidfVectorizer** on our dataset using **sklearn**.
  - We used **PassiveAggressive Classifier**.
  - We saved the built model using **pickle**.

The picture below shows the trained model and the flask API.



```python
import numpy as np
import pandas as pd
import pickle
from tensorflow import keras
from keras.preprocessing.sequence import pad_sequences
from keras.models import Sequential
from keras.layers.embeddings import Embedding
from sklearn.model_selection import train_test_split
from sklearn.feature_extraction.text import TfidfVectorizer
from sklearn.linear_model import PassiveAggressiveClassifier
from sklearn.metrics import accuracy_score, confusion_matrix
from keras import utils

df=pd.read_csv("news.csv")
df.head()


labels = df.label
X_train, X_test, y_train, y_test = train_test_split(df['text'],labels,test_size=1)

tfidf_vectorizer = TfidfVectorizer(stop_words='english', max_df=0.7)

# Fit and transform train set, transform test set
tfidf_train = tfidf_vectorizer.fit_transform(X_train)
tfidf_test  = tfidf_vectorizer.transform(X_test)

# Initialize a PassiveAggressiveClassifier
pac = PassiveAggressiveClassifier(max_iter=50)
pac.fit(tfidf_train,y_train)

# saving vectorizer
with open('tfid.pickle','wb') as f:
    pickle.dump(tfidf_vectorizer,f)

# saving model
with open('model_fakenews.pickle','wb') as f:
    pickle.dump(pac,f)
```



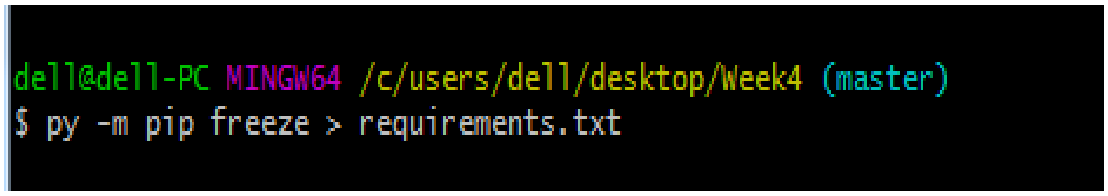
```python
from flask import Flask, render_template, request, url_for, Markup, jsonify
import pickle

app = Flask(__name__)
pickle_in = open('model_fakenews.pickle','rb')
pac = pickle.load(pickle_in)
tfid = open('tfid.pickle','rb')
tfidf_vectorizer = pickle.load(tfid)

@app.route('/')
def home():
    return render_template("index.html")

@app.route('/newscheck')
def newscheck():
    abc = request.args.get('news')
    input_data = [abc.rstrip()]
    # transforming input
    tfidf_test = tfidf_vectorizer.transform(input_data)
    # predicting the input
    y_pred = pac.predict(tfidf_test)
    return jsonify(result = y_pred[0])


if __name__=='__main__':
    app.run(debug=True)
```

- Prepare the required files

  ➢ **create a file called requirements.txt**

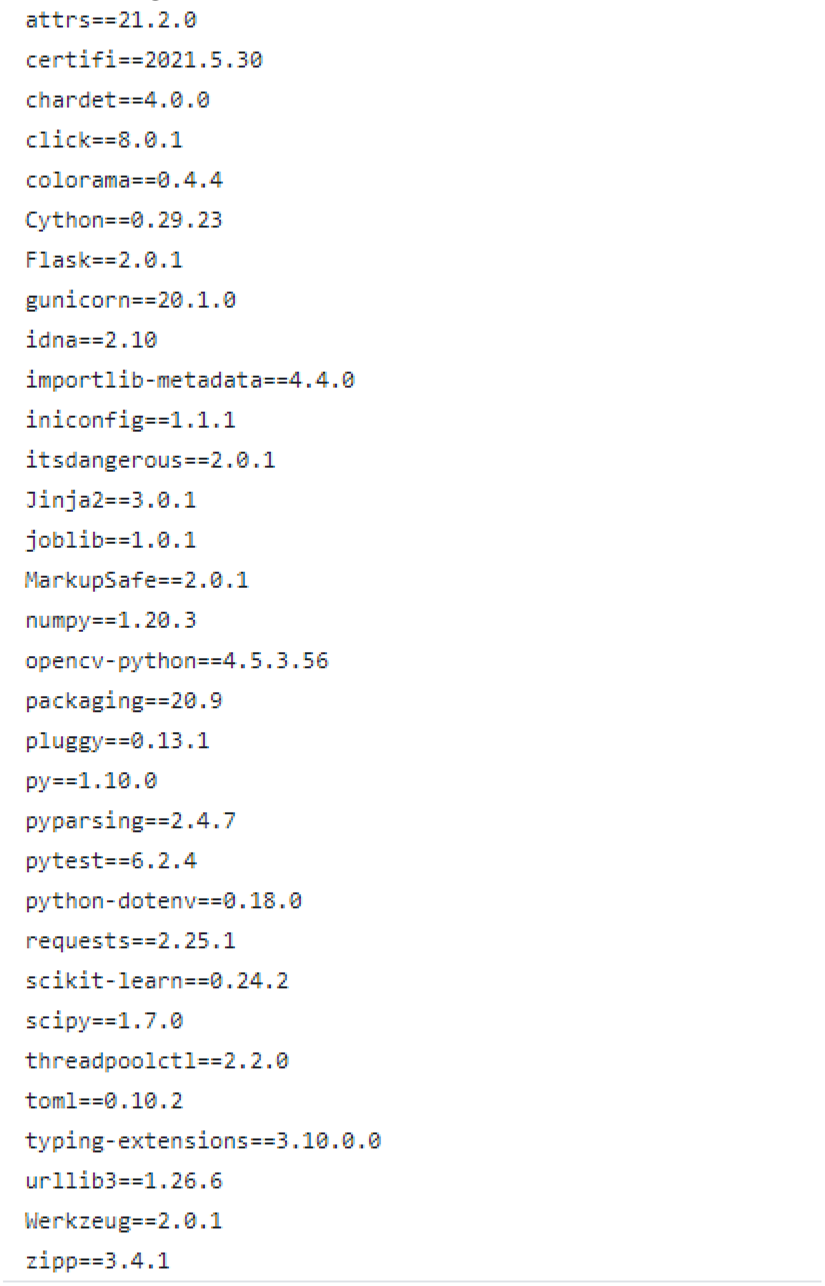
We should define first which libraries the application uses. That way, Heroku knows which ones to provide for us, similar to how we install them locally when developing the app.

To achieve this, we need to create a **requirements.txt** file with all of the modules:



```
dell@dell-PC MINGW64 /c/users/dell/desktop/Week4 (master)
$ py -m pip freeze > requirements.txt
```

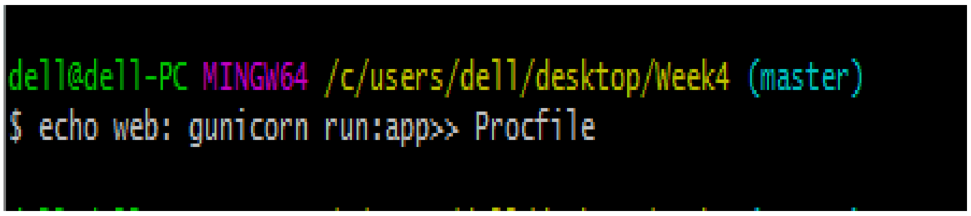
This way we end up with a requirements.txt file that contains the libraries we're using and their versions:



```
attrs==21.2.0
certifi==2021.5.30
chardet==4.0.0
click==8.0.1
colorama==0.4.4
Cython==0.29.23
Flask==2.0.1
gunicorn==20.1.0
idna==2.10
importlib-metadata==4.4.0
iniconfig==1.1.1
itsdangerous==2.0.1
Jinja2==3.0.1
joblib==1.0.1
MarkupSafe==2.0.1
numpy==1.20.3
opencv-python==4.5.3.56
packaging==20.9
pluggy==0.13.1
py==1.10.0
pyparsing==2.4.7
pytest==6.2.4
python-dotenv==0.18.0
requests==2.25.1
scikit-learn==0.24.2
scipy==1.7.0
threadpoolctl==2.2.0
toml==0.10.2
typing-extensions==3.10.0.0
urllib3==1.26.6
Werkzeug==2.0.1
zipp==3.4.1
```

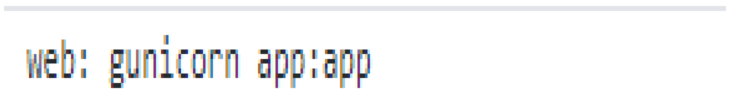
➢ Create a file called Procfile

For Heroku to be able to run our application like it should, we need to define a set of processes/commands that it should run beforehand.



```
dell@dell-PC MINGW64 /c/users/dell/desktop/Week4 (master)
$ echo web: gunicorn run:app>> Procfile
```

These commands are located in the **Procfile**:

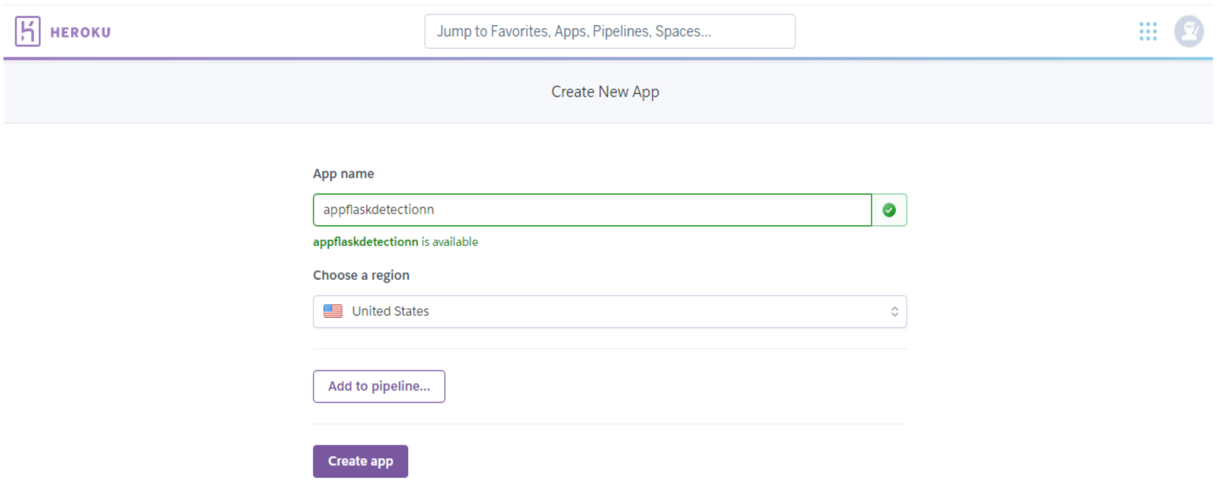


```
web: gunicorn app:app
```

The web command tells Heroku to start a web server for the application, using gunicorn. Since our application is called app.py, we've set the app name to be app as well.

2. Delpoy the app to Heroku

First of all we sign up in heroku and creat an application from Heroku dashboard.

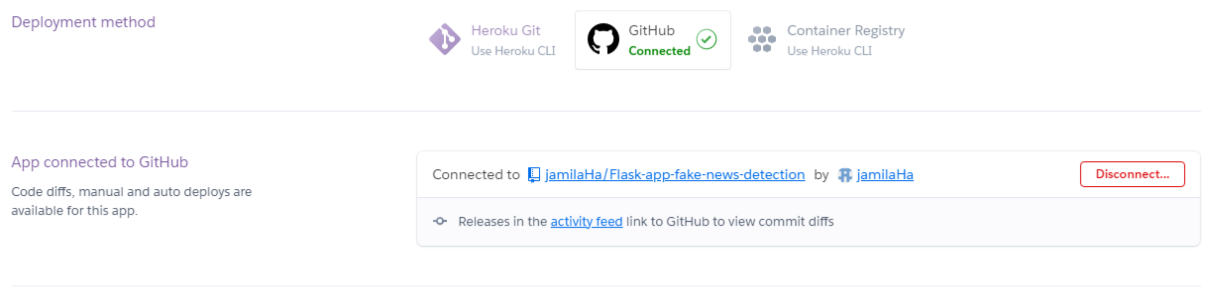


App name: appflaskdetectionn

appflaskdetectionn is available

Choose a region: United States

Then, connect to the app and choose a deployment method, which is in our case Github.


Deployment method

Heroku Git
Use Heroku CLI

GitHub
Connected

Container Registry
Use Heroku CLI

App connected to GitHub

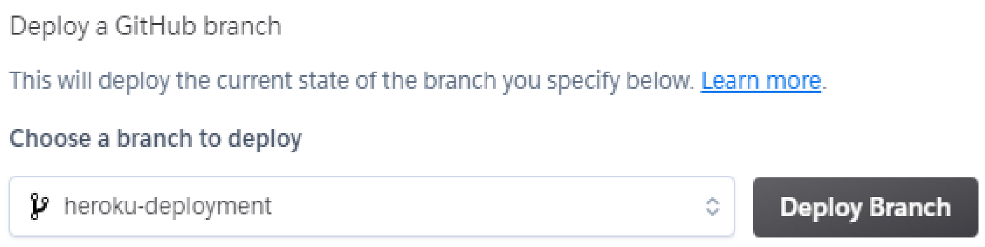
Code diffs, manual and auto deploys are available for this app.

Connected to jamilaHa/Flask-app-fake-news-detection by jamilaHa

Disconnect...

Releases in the activity feed link to GitHub to view commit diffs

After choosing Github method deployment we deploy the app.


Deploy a GitHub branch

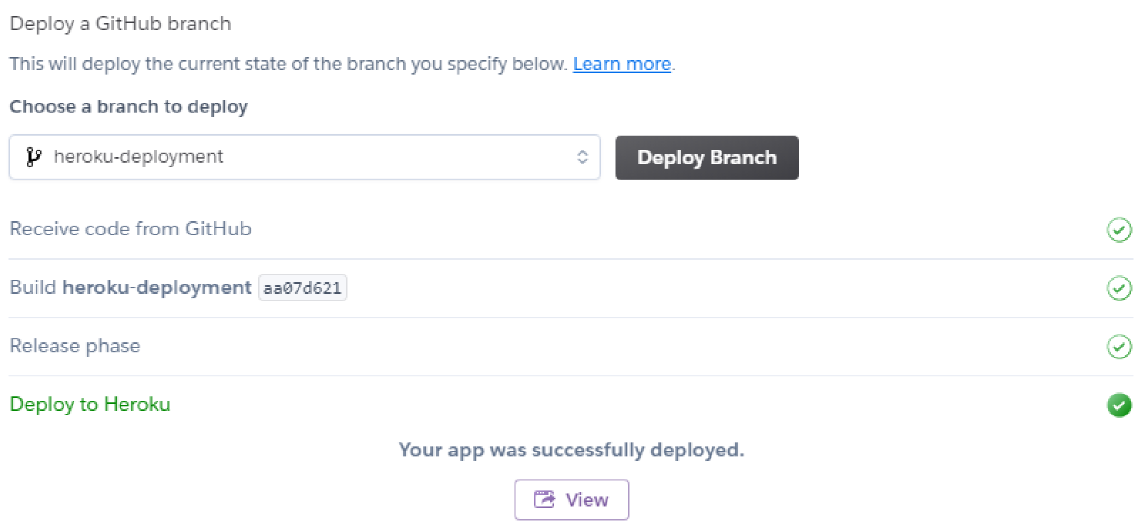
This will deploy the current state of the branch you specify below. Learn more.

Choose a branch to deploy

heroku-deployment

Deploy Branch

After clicking on deploy a "Your app was successfully deployed" message is displayed!


Deploy a GitHub branch

This will deploy the current state of the branch you specify below. Learn more.

Choose a branch to deploy

heroku-deployment

Deploy Branch

Receive code from GitHub ✓

Build **heroku-deployment** `aa07d621` ✓

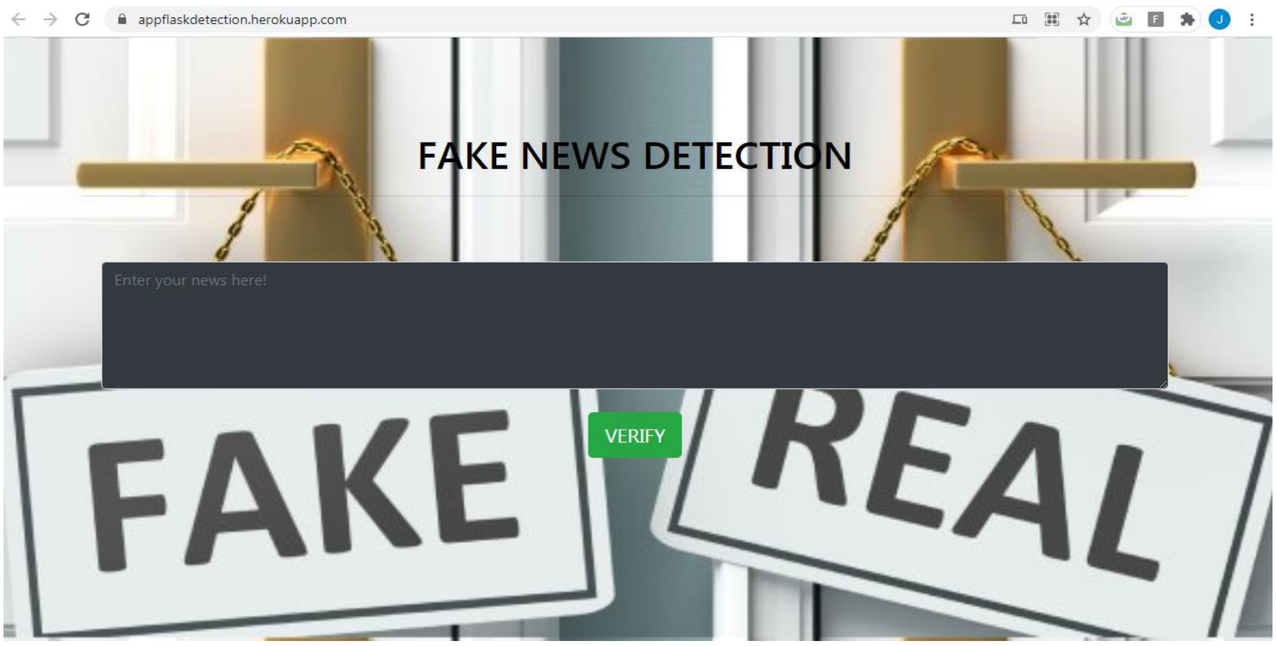
Release phase ✓

Deploy to Heroku ✓

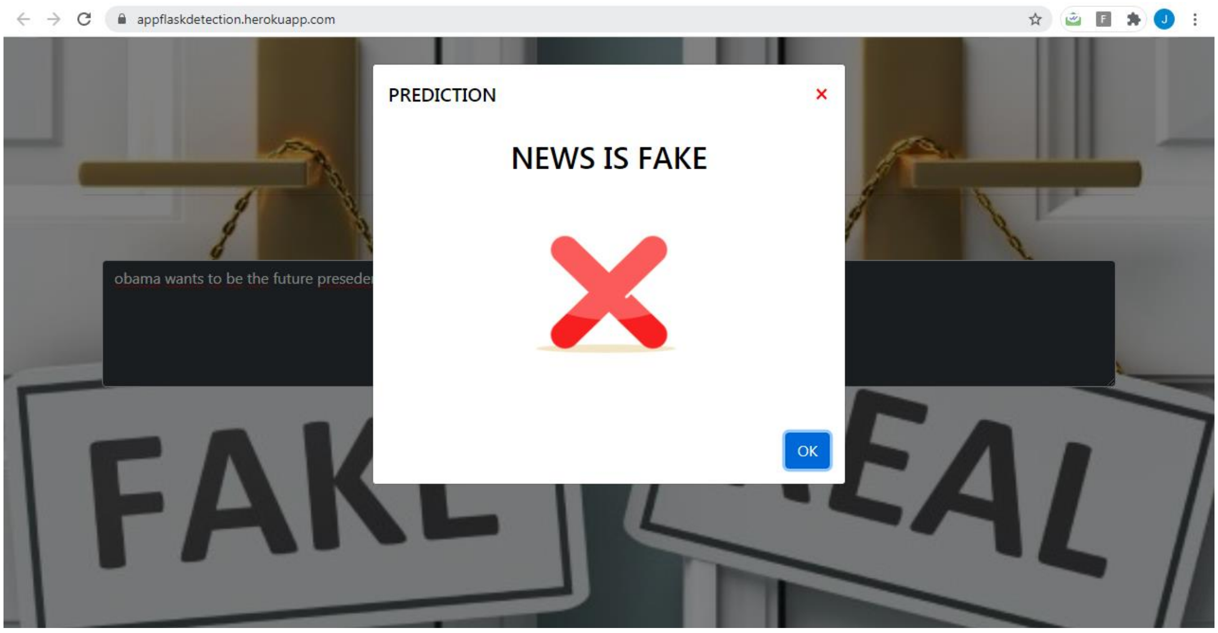
Your app was successfully deployed.

View

Now, the app is ready to use on https://appflaskdetection.herokuapp.com/



3. Testing the app


appflaskdetection.herokuapp.com
PREDICTION
NEWS IS FAKE
obama wants to be the future presede
OK
FAKE
REAL