INNOMATICS
RESEARCH LABS

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STREAMLIT APPLICATION DEBUGGING AND HEROKU DEPLOYMENT

This Task is divided into two parts:

1> *First one is to debug the whole streamlit code.*

2> *Second one is to deploy it to Heroku platform.*

Introduction: *This project is based on a streamlit web app Airline Sentiment Analysis which displays all the graphs and other visualizations and analyses a tweet is a positive tweet or negative tweet using a Machine Learning algorithm which is Logistic Regression. After creating the web app we have to deploy it in the Heroku server.*

Task_1: Debugging the provided streamlit code

Project files:

- *project.py : Main file which runs the entire project using the code* ***streamlit run project.py***

- *data_app.py : This file contains the streamlit code to plot the graphs, visualize the graphs and the dataframe.*

- *ml_app.py : This file contains the entire machine learning code to predict the sentiment that a tweet is positive or negative.*

- *create_wordcloud.py : This file contains the wordcloud generation code.*

Python : *This project is built on Python programming language, the most popular and english readable language which is basically used for creating web applications and software.*

Python Libraries that are used in this project:

- *Matplotlib*
- *Seaborn*
- *Plotly*
- *Pandas*
- *Numpy*
- *Streamlit*
- *Scikit learn*
- *Nltk*
- *Re*
- *Wordcloud*

Debugging:

There are several bugs in the code and I debug those step by step. Most of the bugs are in data_app.py file where I use PIL module to show the images and most of the time I spent to fix the issues in the wordcloud part where the wordcloud is not downloading and failed to import. For this fix I have to update the Microsoft Toolkit which is needed the 14.0 or greater version to download the python packages. And there were more little little bugs which I fixed during this task.

Task_2: Deploying the model in the Heroku cloud server

Step 1: *First of all it is better to create another folder and copy all the project files in that folder.*

Step 2: *We have to download the Heroku CLI and Git CLI. And create an account in the Heroku server.*

Step 3: *Before deploying the model it is mandatory to have some files in the project folder which are*

a. *requirements.txt: It contains all the required python packages*

b. *Procfile: It contains the process or command to run the app.*

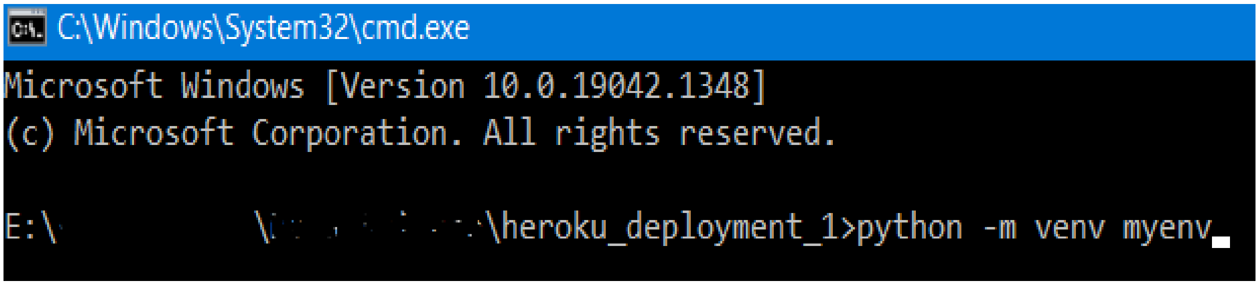
c. *setup.sh (You need **setup.sh only for Streamlit**)*

Step 4: *Now the entire task is performed in cmd . We have to open the cmd in the folder where our project file is available.*

Step 5: *There are lots of python libraries that are installed in our system which we don't even needed in our project so we have to create a separate virtual environment using the below code*

python -m venv venv/

*Here **venv/** is the virtual environment name. I have named my virtual environment as **myenv***

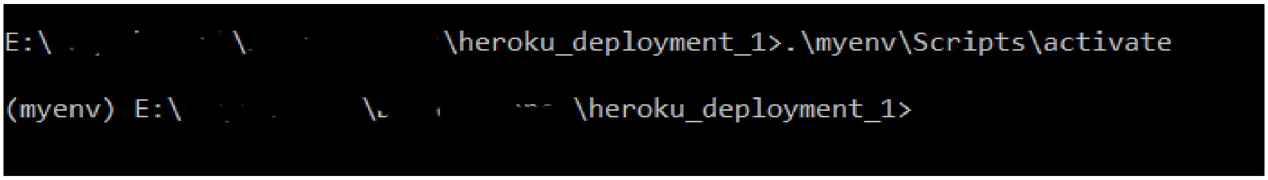


```
Microsoft Windows [Version 10.0.19042.1348]
(c) Microsoft Corporation. All rights reserved.

E:\[redacted]\[redacted]\heroku_deployment_1>python -m venv myenv
```

Step 6: *After creating our virtual environment we have to activate the virtual environment or basically enter to the virtual environment so using the below code we'll enter in the environment*

.\myenv \Scripts\activate

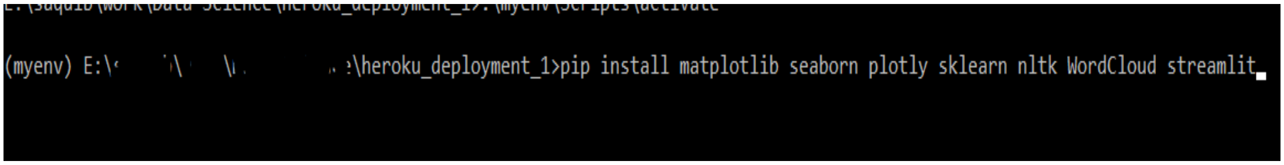
Here ***myenv*** *is the name of the virtual environment. And we can see that in the right hand side.*



```
E:\[redacted]\heroku_deployment_1>.\myenv\Scripts\activate

(myenv) E:\[redacted]\heroku_deployment_1>
```

Step 7: *Now we are set with the environment and we have to install all the necessary libraries that we used in the code using pip command*

Pip install packages_names



```
E:\Saquib\Work\Data Science\heroku_deployment_1>.\myenv\Scripts\activate

(myenv) E:\[redacted]\heroku_deployment_1>pip install matplotlib seaborn plotly sklearn nltk WordCloud streamlit_
```

Step 8: *After installing the libraries as I mentioned before that we need a requirements.txt file which contains all the libraries but we can't do it manually so we use below command to create requirements.txt file as well as get those packages in the requirements.txt file*

pip freeze > requirements.txt

Step 9: *Now we have to move it to the project root folder and change the directory to the root folder.*

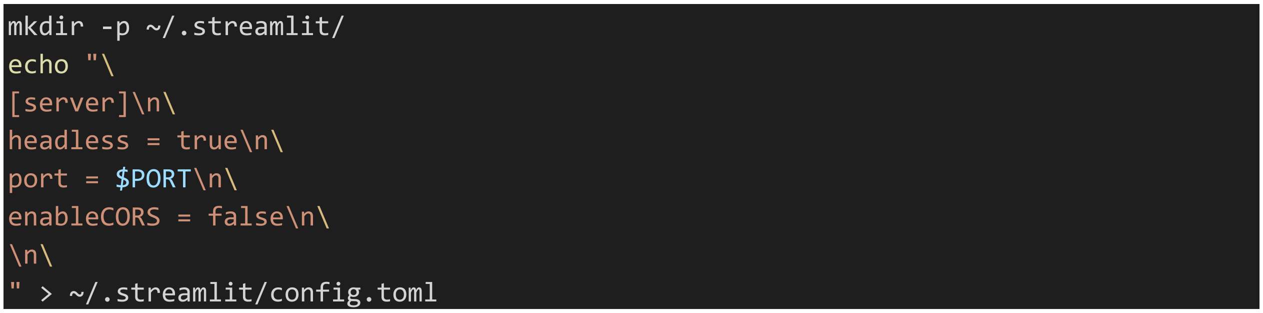
Step 10: *Create the* ***Procfile*** *which contains the below code. Here* ***project****.****py*** *is my main file which runs the entire project.*

web: sh setup.sh && streamlit run project.py

Step 11: *Create the* ***setup.sh*** *file which contains the below code*

```
mkdir -p ~/.streamlit/
echo "\
[general]\n\
email = \"your@gmail.com\"\n\
" > ~/.streamlit/credentials.toml
echo "\
[server]\n\
headless = true\n\
enableCORS=false\n\
port = $PORT\n\
" > ~/.streamlit/config.toml
```

OR



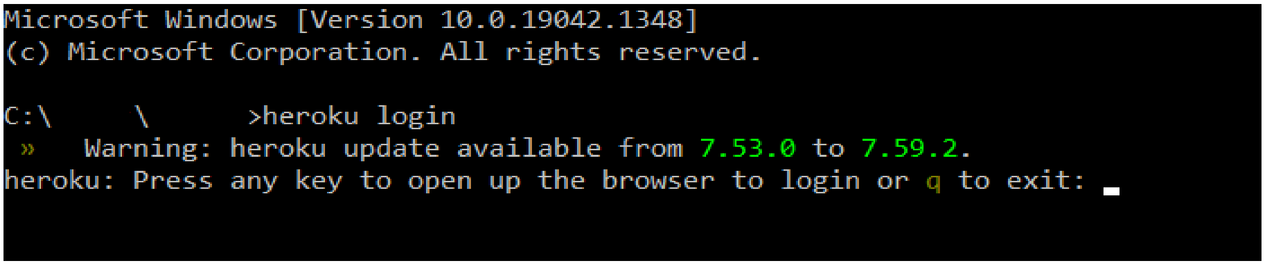
```
mkdir -p ~/.streamlit/
echo "\
[server]\n\
headless = true\n\
port = $PORT\n\
enableCORS = false\n\
\n\
" > ~/.streamlit/config.toml
```

I used the second one because the first one was throwing some error. Just use the first one first then if it not runs then use the second one.

Step 12: *After doing all the above necessary steps now it is the time to log in to the Heroku server by using the below command*

heroku login

It’ll ask to press any key to continue or press q to quit and after pressing the key it’ll redirect you to the heroku login page.



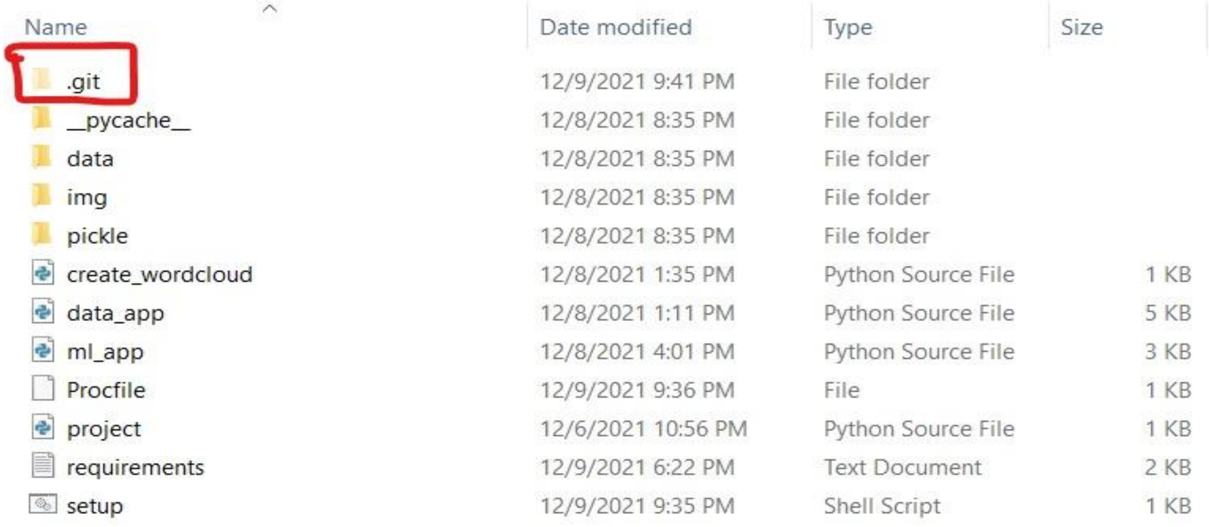
```
Microsoft Windows [Version 10.0.19042.1348]
(c) Microsoft Corporation. All rights reserved.

C:\     \      >heroku login
 »   Warning: heroku update available from 7.53.0 to 7.59.2.
heroku: Press any key to open up the browser to login or q to exit: _
```

Step 13: *After login in to the Heroku server just* ***create an application*** *by pressing the new key provided in the left handside of the page and give the application name.*

Step 14: *After* ***login*** *to the* ***heroku*** *server and creating the application we have to initialize an empty* ***repository*** *to our root folder of the project by providing the below command*

git init .

This will create a .git folder in the main project folder as you can see in the below screenshot



Name	Date modified	Type	Size
.git	12/9/2021 9:41 PM	File folder	
__pycache__	12/8/2021 8:35 PM	File folder	
data	12/8/2021 8:35 PM	File folder	
img	12/8/2021 8:35 PM	File folder	
pickle	12/8/2021 8:35 PM	File folder	
create_wordcloud	12/8/2021 1:35 PM	Python Source File	1 KB
data_app	12/8/2021 1:11 PM	Python Source File	5 KB
ml_app	12/8/2021 4:01 PM	Python Source File	3 KB
Procfile	12/9/2021 9:36 PM	File	1 KB
project	12/6/2021 10:56 PM	Python Source File	1 KB
requirements	12/9/2021 6:22 PM	Text Document	2 KB
setup	12/9/2021 9:35 PM	Shell Script	1 KB

Step 15: *Now after creating an empty repository if you check the status using the below code we'll see the code files in red color which we have add to the repository.*

```
git status
```

Step 16: *We have to add the code files in the repository using the below command. And after adding the files if you check the* **git status** *again the files shows in green color now.*

```
git add *
```

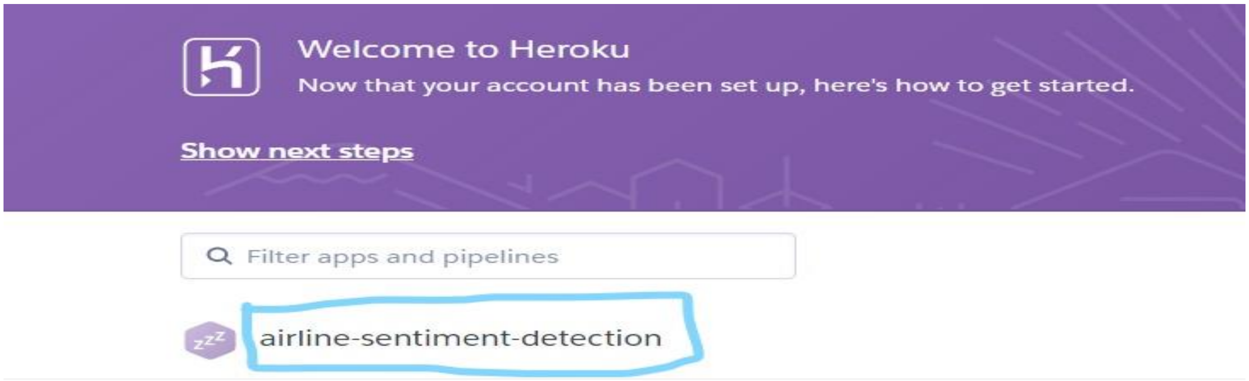
Step 17: *Now commit the above changes to the git using the below command and give a message to know or identify which changes you made.*

```
git commit –m "your message"
```

Step 18: *Now we have to run the following git remote command. Basically git remotes are versions of your repository that live on other servers. You deploy your app by pushing its code to a special Heroku-hosted remote that's associated with your app.*

```
heroku git:remote -a app_name
```

Here app_name is the application name you provided while creating the app in heroku server. In my case the app name is airline-sentiment-detection.



Welcome to Heroku

Now that your account has been set up, here's how to get started.

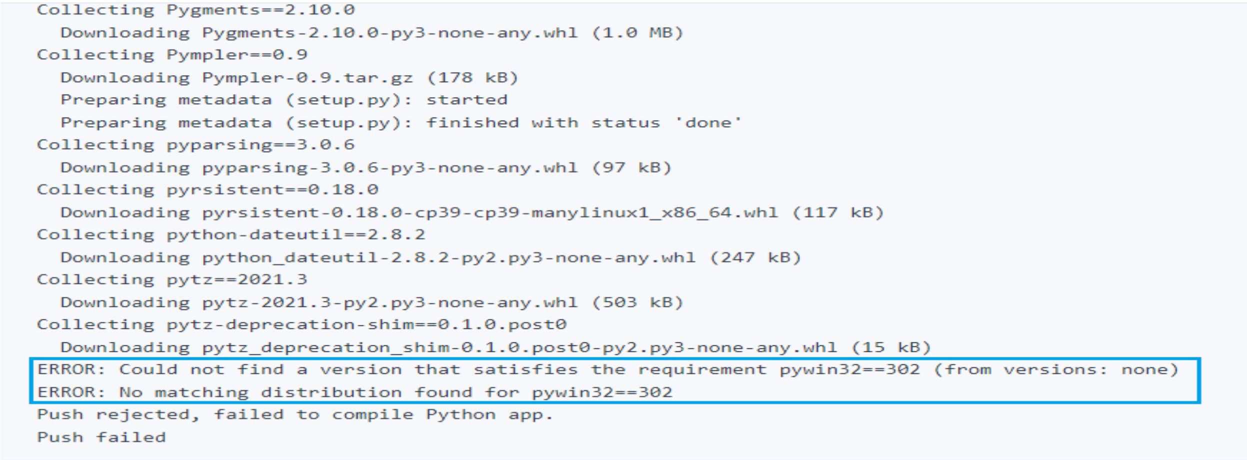
Step 19: *After completing all the previous steps now it is the show time ☺ We have to push our application to the Heroku server by using the following command.*

git push heroku master

It'll start downloading all the packages which we saved in the requirments.txt file and doing the rest of the task of deployment in the server.

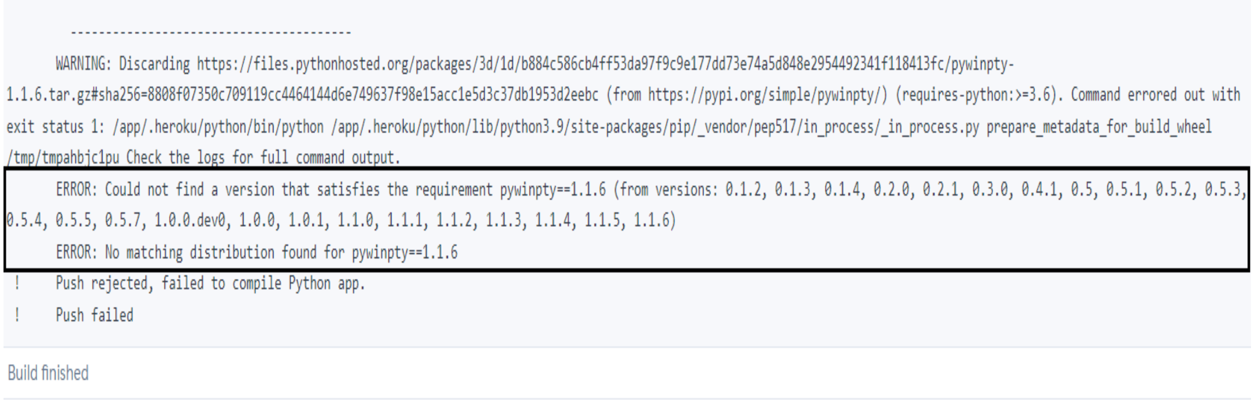
While this was running it might throws some errors

1. *pywin32==302* : *I simply delete it from my requirements.txt file (It might occurs because Heroku internally uses Linux and I'm using windows and this file is present in my computer.)*



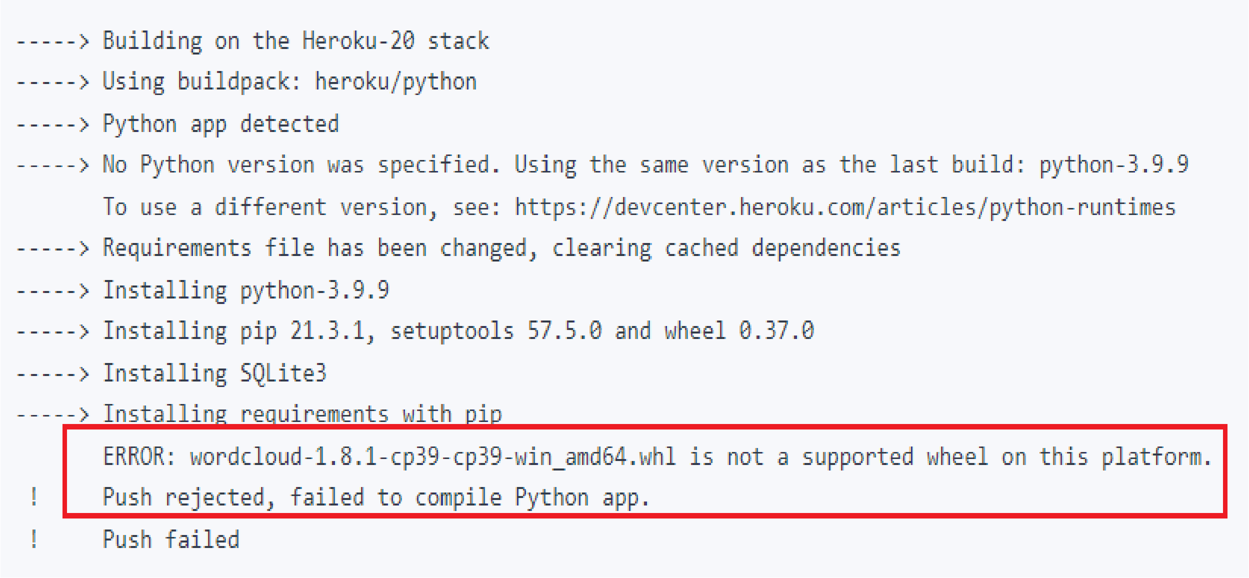
```
Collecting Pygments==2.10.0
  Downloading Pygments-2.10.0-py3-none-any.whl (1.0 MB)
Collecting Pympler==0.9
  Downloading Pympler-0.9.tar.gz (178 kB)
  Preparing metadata (setup.py): started
  Preparing metadata (setup.py): finished with status 'done'
Collecting pyparsing==3.0.6
  Downloading pyparsing-3.0.6-py3-none-any.whl (97 kB)
Collecting pyrsistent==0.18.0
  Downloading pyrsistent-0.18.0-cp39-cp39-manylinux1_x86_64.whl (117 kB)
Collecting python-dateutil==2.8.2
  Downloading python_dateutil-2.8.2-py2.py3-none-any.whl (247 kB)
Collecting pytz==2021.3
  Downloading pytz-2021.3-py2.py3-none-any.whl (503 kB)
Collecting pytz-deprecation-shim==0.1.0.post0
  Downloading pytz_deprecation_shim-0.1.0.post0-py2.py3-none-any.whl (15 kB)
ERROR: Could not find a version that satisfies the requirement pywin32==302 (from versions: none)
ERROR: No matching distribution found for pywin32==302
Push rejected, failed to compile Python app.
Push failed
```

2. *pywinpty==1.1.6* : *It is an issue with the version 1.1.6 .It can't detect the particular version so I simply make it pywinpty<1.1.6 . Here what happened is it will automatically check the versions and run its suitable version.*



```
    ---------------------------------------
      WARNING: Discarding https://files.pythonhosted.org/packages/3d/1d/b884c586cb4ff53da97f9c9e177dd73e74a5d848e2954492341f118413fc/pywinpty-
1.1.6.tar.gz#sha256=8808f07350c709119cc4464144d6e749637f98e15acc1e5d3c37db1953d2eebc (from https://pypi.org/simple/pywinpty/) (requires-python:>=3.6). Command errored out with
exit status 1: /app/.heroku/python/bin/python /app/.heroku/python/lib/python3.9/site-packages/pip/_vendor/pep517/in_process/_in_process.py prepare_metadata_for_build_wheel
/tmp/tmpahbjc1pu Check the logs for full command output.
      ERROR: Could not find a version that satisfies the requirement pywinpty==1.1.6 (from versions: 0.1.2, 0.1.3, 0.1.4, 0.2.0, 0.2.1, 0.3.0, 0.4.1, 0.5, 0.5.1, 0.5.2, 0.5.3,
0.5.4, 0.5.5, 0.5.7, 1.0.0.dev0, 1.0.0, 1.0.1, 1.1.0, 1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.1.5, 1.1.6)
      ERROR: No matching distribution found for pywinpty==1.1.6
 !    Push rejected, failed to compile Python app.
 !    Push failed

Build finished
```

3. *Wheel issue* : *I faced this wheel issue also so what I did is I update my Microsoft toolkit version and It fixed this issue also.*



```
-----> Building on the Heroku-20 stack
-----> Using buildpack: heroku/python
-----> Python app detected
-----> No Python version was specified. Using the same version as the last build: python-3.9.9
       To use a different version, see: https://devcenter.heroku.com/articles/python-runtimes
-----> Requirements file has been changed, clearing cached dependencies
-----> Installing python-3.9.9
-----> Installing pip 21.3.1, setuptools 57.5.0 and wheel 0.37.0
-----> Installing SQLite3
-----> Installing requirements with pip
       ERROR: wordcloud-1.8.1-cp39-cp39-win_amd64.whl is not a supported wheel on this platform.
 !     Push rejected, failed to compile Python app.
 !     Push failed
```

After solving all the issues I just do the same thing again which is

1. git status

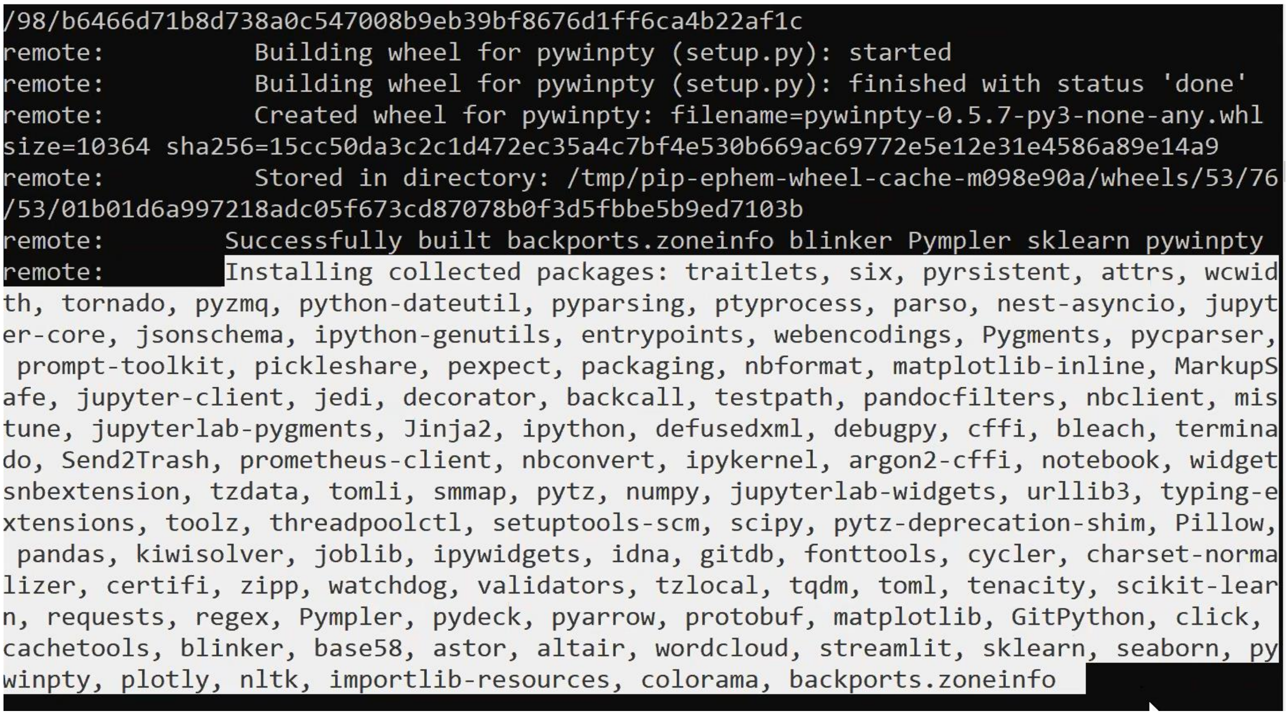
*2. git add **

3. git commit –m "your message"

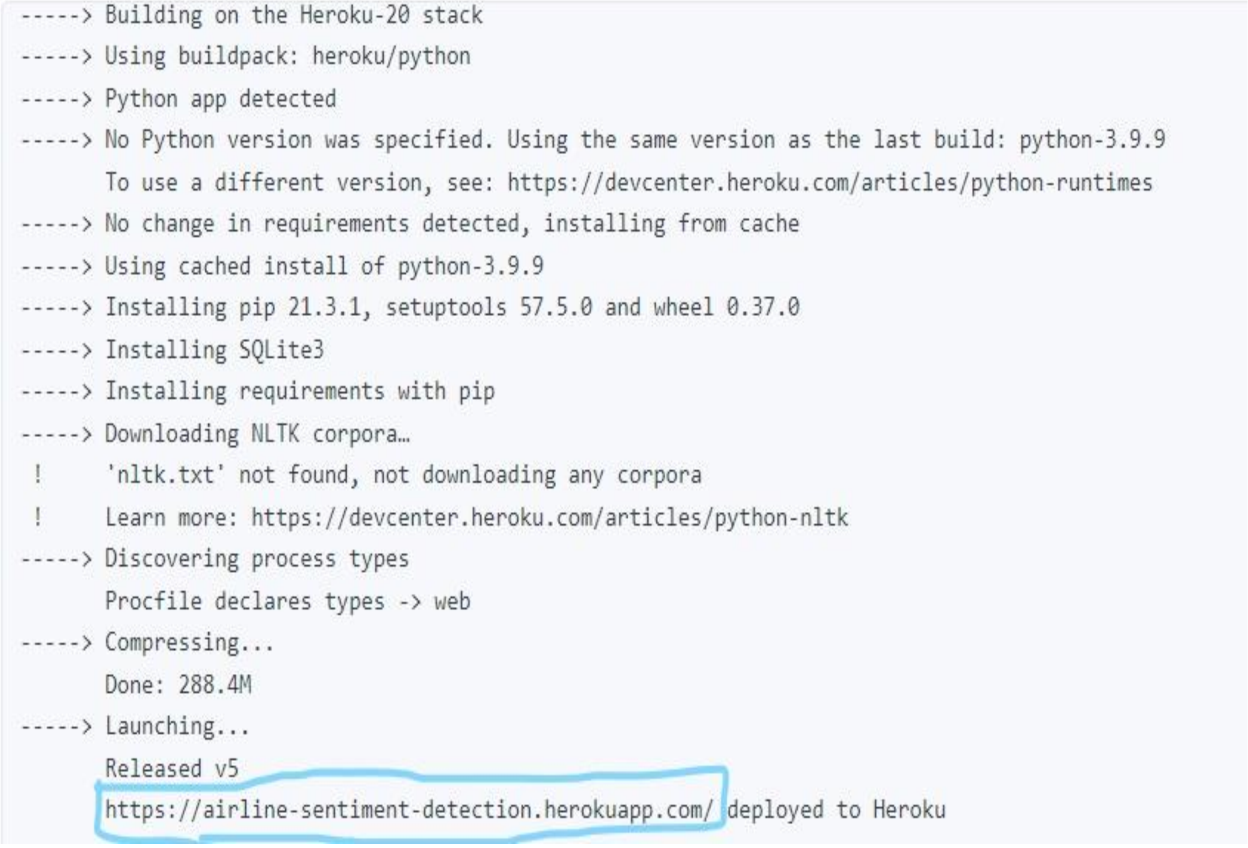
4. git push heroku master

(I solved the issues one by one and after each changes, I did the above steps)

Finally, we can see that it has been installing all the packages and give us a link for our application.



```
/98/b6466d71b8d738a0c547008b9eb39bf8676d1ff6ca4b22af1c
remote:          Building wheel for pywinpty (setup.py): started
remote:          Building wheel for pywinpty (setup.py): finished with status 'done'
remote:          Created wheel for pywinpty: filename=pywinpty-0.5.7-py3-none-any.whl
size=10364 sha256=15cc50da3c2c1d472ec35a4c7bf4e530b669ac69772e5e12e31e4586a89e14a9
remote:          Stored in directory: /tmp/pip-ephem-wheel-cache-m098e90a/wheels/53/76
/53/01b01d6a997218adc05f673cd87078b0f3d5fbbe5b9ed7103b
remote:        Successfully built backports.zoneinfo blinker Pympler sklearn pywinpty
remote:        Installing collected packages: traitlets, six, pyrsistent, attrs, wcwid
th, tornado, pyzmq, python-dateutil, pyparsing, ptyprocess, parso, nest-asyncio, jupyt
er-core, jsonschema, ipython-genutils, entrypoints, webencodings, Pygments, pycparser,
 prompt-toolkit, pickleshare, pexpect, packaging, nbformat, matplotlib-inline, MarkupS
afe, jupyter-client, jedi, decorator, backcall, testpath, pandocfilters, nbclient, mis
tune, jupyterlab-pygments, Jinja2, ipython, defusedxml, debugpy, cffi, bleach, termina
do, Send2Trash, prometheus-client, nbconvert, ipykernel, argon2-cffi, notebook, widget
snbextension, tzdata, tomli, smmap, pytz, numpy, jupyterlab-widgets, urllib3, typing-e
xtensions, toolz, threadpoolctl, setuptools-scm, scipy, pytz-deprecation-shim, Pillow,
 pandas, kiwisolver, joblib, ipywidgets, idna, gitdb, fonttools, cycler, charset-norma
lizer, certifi, zipp, watchdog, validators, tzlocal, tqdm, toml, tenacity, scikit-lear
n, requests, regex, Pympler, pydeck, pyarrow, protobuf, matplotlib, GitPython, click,
cachetools, blinker, base58, astor, altair, wordcloud, streamlit, sklearn, seaborn, py
winpty, plotly, nltk, importlib-resources, colorama, backports.zoneinfo
```



```
-----> Building on the Heroku-20 stack
-----> Using buildpack: heroku/python
-----> Python app detected
-----> No Python version was specified. Using the same version as the last build: python-3.9.9
       To use a different version, see: https://devcenter.heroku.com/articles/python-runtimes
-----> No change in requirements detected, installing from cache
-----> Using cached install of python-3.9.9
-----> Installing pip 21.3.1, setuptools 57.5.0 and wheel 0.37.0
-----> Installing SQLite3
-----> Installing requirements with pip
-----> Downloading NLTK corpora…
 !     'nltk.txt' not found, not downloading any corpora
 !     Learn more: https://devcenter.heroku.com/articles/python-nltk
-----> Discovering process types
       Procfile declares types -> web
-----> Compressing...
       Done: 288.4M
-----> Launching...
       Released v5
       https://airline-sentiment-detection.herokuapp.com/ deployed to Heroku
```

The highlighted part is the link of the application.

My App Link: *https://airline-sentiment-detection.herokuapp.com/*