

Text classification with machine learning application

In the last stage of this assessment we will create a flask based web application which will take input as a text from the user and the application will tell the user whether the sentiment was good,bad or just okay.

```
In [11]: #getting the necessary package
from flask import Flask, request, jsonify
import pickle
import re
from nltk.tokenize import word_tokenize
from nltk.corpus import stopwords
from sklearn.feature_extraction.text import TfidfVectorizer
```

```
In [26]: !pip install flask-ngrok

WARNING: Ignoring invalid distribution -tatsmodels (c:\users\sujoydutta\anaconda3\lib\site-packages)
WARNING: Ignoring invalid distribution -illow (c:\users\sujoydutta\anaconda3\lib\site-packages)
WARNING: Ignoring invalid distribution -tatsmodels (c:\users\sujoydutta\anaconda3\lib\site-packages)
WARNING: Ignoring invalid distribution -illow (c:\users\sujoydutta\anaconda3\lib\site-packages)
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WARNING: Ignoring invalid distribution -tatsmodels (c:\users\sujoydutta\anaconda3\lib\site-packages)
WARNING: Ignoring invalid distribution -illow (c:\users\sujoydutta\anaconda3\lib\site-packages)
Collecting flask-ngrok
  Downloading flask-ngrok-0.0.25-py3-none-any.whl (3.1 kB)
Requirement already satisfied: requests in c:\users\sujoydutta\anaconda3\lib\site-packages (from flask-ngrok) (2.28.1)
Requirement already satisfied: Flask>=0.8 in c:\users\sujoydutta\anaconda3\lib\site-packages (from flask-ngrok) (1.1.2)
Requirement already satisfied: itsdangerous>=0.24 in c:\users\sujoydutta\anaconda3\lib\site-packages (from Flask>=0.8->flask-ngrok) (2.0.1)
Requirement already satisfied: Jinja2>=2.10.1 in c:\users\sujoydutta\anaconda3\lib\site-packages (from Flask>=0.8->flask-ngrok) (3.0.3)
Requirement already satisfied: Werkzeug>=0.15 in c:\users\sujoydutta\anaconda3\lib\site-packages (from Flask>=0.8->flask-ngrok) (2.0.3)
Requirement already satisfied: click>=5.1 in c:\users\sujoydutta\anaconda3\lib\site-packages (from Flask>=0.8->flask-ngrok) (8.0.4)
Requirement already satisfied: idna<4,>=2.5 in c:\users\sujoydutta\anaconda3\lib\site-packages (from requests->flask-ngrok) (3.4)
Requirement already satisfied: charset-normalizer<3,>=2 in c:\users\sujoydutta\anaconda3\lib\site-packages (from requests->flask-ngrok) (2.0.4)
Requirement already satisfied: certifi>=2017.4.17 in c:\users\sujoydutta\anaconda3\lib\site-packages (from requests->flask-ngrok) (2022.6.15)
Requirement already satisfied: urllib3<1.27,>=1.21.1 in c:\users\sujoydutta\anaconda3\lib\site-packages (from requests->flask-ngrok) (1.26.13)
Requirement already satisfied: colorama in c:\users\sujoydutta\anaconda3\lib\site-packages (from click>=5.1->Flask>=0.8->flask-ngrok) (0.4.6)
Requirement already satisfied: MarkupSafe>=2.0 in c:\users\sujoydutta\anaconda3\lib\site-packages (from Jinja2>=2.10.1->Flask>=0.8->flask-ngrok) (2.0.1)
Installing collected packages: flask-ngrok
Successfully installed flask-ngrok-0.0.25
```

```
In [27]: from flask_ngrok import run_with_ngrok
```

```
In [5]: # Loading the pickled sentiment classifier model
with open('text_classifier.pkl', 'rb') as model_file:
    text_classifier = pickle.load(model_file)

C:\Users\sujoydutta\anaconda3\lib\site-packages\sklearn\base.py:329: UserWarning: Trying to unpickle estimator RandomForestClassifier from version 1.2.2 when using version 1.1.3. This might lead to breaking code or invalid results. Use at your own risk. For more info please refer to:
https://scikit-learn.org/stable/model_persistence.html#security-maintainability-limitations
  warnings.warn(
```

```
In [12]: # Preprocess_text function
def preprocess_text(text):
    text = re.sub(r'<.*?>', '', text) # Remove HTML tags
    text = re.sub(r'[^\w-zA-Z]', '', text) # Keep only letters
    words = word_tokenize(text)
    stop_words = set(stopwords.words('english'))
    filtered_words = [word.lower() for word in words if word.lower() not in stop_words]
    cleaned_text = ' '.join(filtered_words)
    return cleaned_text
```

```
In [13]: # Initializing the TF-IDF vectorizer with a maximum of 10,000 features
tfidf_vectorizer = TfidfVectorizer(max_features=10000)
```

```
In [31]: app = Flask(__name__)
run_with_ngrok(app)
```

```
In [32]: # route to render the HTML form and predict sentiment
@app.route('/')
def abode():
    return render_template('predict.html', sentiment=None)
```

```
In [33]: # route to accept user input and make predictions
@app.route('/predict', methods=['POST'])
def tell_sentiment():
    user_input = request.form['user_input']

    cleaned_input = preprocess_text(user_input)

    transformed_input = tfidf_vectorizer.transform([cleaned_input])

    prediction = text_classifier.predict(transformed_input)

    sentiment_labels = {0: 'negative', 1: 'neutral', 2: 'positive'}
    predicted_sentiment = sentiment_labels[prediction[0]]

    return render_template('predict.html', sentiment=predicted_sentiment)
```

```
In [ ]: if __name__ == '__main__':
        app.run()
```

```
* Serving Flask app "__main__" (lazy loading)
* Environment: production
  WARNING: This is a development server. Do not use it in a production deployment.
  Use a production WSGI server instead.
* Debug mode: off

* Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
[2023-10-22 15:40:10,296] ERROR in app: Exception on / [GET]
Traceback (most recent call last):
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\app.py", line 2447, in wsgi_app
    response = self.full_dispatch_request()
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\app.py", line 1952, in full_dispatch_request
    rv = self.handle_user_exception(e)
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\app.py", line 1821, in handle_user_exception
    reraise(exc_type, exc_value, tb)
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\_compat.py", line 39, in reraise
    raise value
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\app.py", line 1950, in full_dispatch_request
    rv = self.dispatch_request()
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\app.py", line 1936, in dispatch_request
    return self.view_functions[rule.endpoint](**req.view_args)
  File "C:\Users\sujoydutta\AppData\Local\Temp\ipykernel_21076\3437094937.py", line 4, in abode
    return render_template('predict.html', sentiment=None)
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\templating.py", line 138, in render_template
    ctx.app.jinja_env.get_or_select_template(template_name_or_list),
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\jinja2\environment.py", line 930, in get_or_select_template
    return self.get_template(template_name_or_list, parent, globals)
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\jinja2\environment.py", line 883, in get_template
    return self._load_template(name, self.make_globals(globals))
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\jinja2\environment.py", line 857, in _load_template
    template = self.loader.load(self, name, globals)
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\jinja2\loaders.py", line 115, in load
    source, filename, uptodate = self.get_source(environment, name)
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\templating.py", line 60, in get_source
    return self._get_source_fast(environment, template)
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\templating.py", line 89, in _get_source_fast
    raise TemplateNotFound(template)
jinja2.exceptions.TemplateNotFound: predict.html
127.0.0.1 - - [22/Oct/2023 15:40:14] "GET / HTTP/1.1" 500 -
Exception in thread Thread-9:
Traceback (most recent call last):
  File "C:\Users\sujoydutta\anaconda3\lib\threading.py", line 973, in _bootstrap_inner
    * Running on http://71f8-122-161-51-78.ngrok.io
    * Traffic stats available on http://127.0.0.1:4040

    self.run()
  File "C:\Users\sujoydutta\anaconda3\lib\threading.py", line 1299, in run
    self.function(*self.args, **self.kwargs)
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask_ngrok.py", line 70, in start_ngrok
    ngrok_address = _run_ngrok()
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask_ngrok.py", line 38, in _run_ngrok
    tunnel_url = j['tunnels'][0]['public_url'] # Do the parsing of the get
IndexError: list index out of range
[2023-10-22 15:42:12,260] ERROR in app: Exception on / [GET]
Traceback (most recent call last):
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\app.py", line 2447, in wsgi_app
    response = self.full_dispatch_request()
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\app.py", line 1952, in full_dispatch_request
    rv = self.handle_user_exception(e)
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\app.py", line 1821, in handle_user_exception
    reraise(exc_type, exc_value, tb)
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\_compat.py", line 39, in reraise
    raise value
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\app.py", line 1950, in full_dispatch_request
    rv = self.dispatch_request()
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\app.py", line 1936, in dispatch_request
    return self.view_functions[rule.endpoint](**req.view_args)
  File "C:\Users\sujoydutta\AppData\Local\Temp\ipykernel_21076\3437094937.py", line 4, in abode
    return render_template('predict.html', sentiment=None)
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\templating.py", line 138, in render_template
    ctx.app.jinja_env.get_or_select_template(template_name_or_list),
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\jinja2\environment.py", line 930, in get_or_select_template
    return self.get_template(template_name_or_list, parent, globals)
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\jinja2\environment.py", line 883, in get_template
    return self._load_template(name, self.make_globals(globals))
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\jinja2\environment.py", line 857, in _load_template
    template = self.loader.load(self, name, globals)
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\jinja2\loaders.py", line 115, in load
    source, filename, uptodate = self.get_source(environment, name)
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\templating.py", line 60, in get_source
    return self._get_source_fast(environment, template)
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\templating.py", line 89, in _get_source_fast
    raise TemplateNotFound(template)
jinja2.exceptions.TemplateNotFound: predict.html
127.0.0.1 - - [22/Oct/2023 15:42:12] "GET / HTTP/1.1" 500 -
127.0.0.1 - - [22/Oct/2023 15:42:15] "GET /favicon.ico HTTP/1.1" 404 -
[2023-10-22 15:43:01,674] ERROR in app: Exception on / [GET]
Traceback (most recent call last):
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\app.py", line 2447, in wsgi_app
    response = self.full_dispatch_request()
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\app.py", line 1952, in full_dispatch_request
    rv = self.handle_user_exception(e)
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\app.py", line 1821, in handle_user_exception
    reraise(exc_type, exc_value, tb)
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\_compat.py", line 39, in reraise
    raise value
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\app.py", line 1950, in full_dispatch_request
    rv = self.dispatch_request()
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\app.py", line 1936, in dispatch_request
    return self.view_functions[rule.endpoint](**req.view_args)
  File "C:\Users\sujoydutta\AppData\Local\Temp\ipykernel_21076\3437094937.py", line 4, in abode
    return render_template('predict.html', sentiment=None)
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\templating.py", line 138, in render_template
    ctx.app.jinja_env.get_or_select_template(template_name_or_list),
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\jinja2\environment.py", line 930, in get_or_select_template
    return self.get_template(template_name_or_list, parent, globals)
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  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\jinja2\environment.py", line 857, in _load_template
    template = self.loader.load(self, name, globals)
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\jinja2\loaders.py", line 115, in load
    source, filename, uptodate = self.get_source(environment, name)
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\templating.py", line 60, in get_source
    return self._get_source_fast(environment, template)
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\templating.py", line 89, in _get_source_fast
    raise TemplateNotFound(template)
jinja2.exceptions.TemplateNotFound: predict.html
127.0.0.1 - - [22/Oct/2023 15:43:01] "GET / HTTP/1.1" 500 -
127.0.0.1 - - [22/Oct/2023 15:43:08] "GET /favicon.ico HTTP/1.1" 404 -
[2023-10-22 15:49:29,665] ERROR in app: Exception on / [GET]
Traceback (most recent call last):
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\app.py", line 2447, in wsgi_app
    response = self.full_dispatch_request()
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\app.py", line 1952, in full_dispatch_request
    rv = self.handle_user_exception(e)
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\app.py", line 1821, in handle_user_exception
    reraise(exc_type, exc_value, tb)
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\_compat.py", line 39, in reraise
    raise value
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\app.py", line 1950, in full_dispatch_request
    rv = self.dispatch_request()
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\app.py", line 1936, in dispatch_request
    return self.view_functions[rule.endpoint](**req.view_args)
  File "C:\Users\sujoydutta\AppData\Local\Temp\ipykernel_21076\3437094937.py", line 4, in abode
    return render_template('predict.html', sentiment=None)
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\templating.py", line 138, in render_template
    ctx.app.jinja_env.get_or_select_template(template_name_or_list),
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\jinja2\environment.py", line 930, in get_or_select_template
    return self.get_template(template_name_or_list, parent, globals)
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\jinja2\environment.py", line 883, in get_template
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  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\jinja2\environment.py", line 857, in _load_template
    template = self.loader.load(self, name, globals)
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\jinja2\loaders.py", line 115, in load
    source, filename, uptodate = self.get_source(environment, name)
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\templating.py", line 60, in get_source
    return self._get_source_fast(environment, template)
  File "C:\Users\sujoydutta\anaconda3\lib\site-packages\flask\templating.py", line 89, in _get_source_fast
    raise TemplateNotFound(template)
jinja2.exceptions.TemplateNotFound: predict.html
127.0.0.1 - - [22/Oct/2023 15:49:39] "GET / HTTP/1.1" 500 -
127.0.0.1 - - [22/Oct/2023 15:49:44] "GET /favicon.ico HTTP/1.1" 404 -
```