LABORATORY REPORT

Application Development Lab (CS33002)

B.Tech Program in ECSc

Submitted By

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Experiment Number	8
Experiment Title	Sentiment Prediction API Using FastAPI and X (formerly Twitter) Tweets
Date of Experiment	25/3/2025
Date of Submission	31/3/2025

github: https://github.com/Bhairavg7/AD_LAB_8.git

1. Objective:- The objective of this lab experiment is to create a sentiment prediction API using FastAPI, which analyzes Twitter tweets for positive, negative, or neutral sentiment. This lab integrates natural language processing (NLP) techniques with a lightweight and high-performance API framework.

2. Procedure:-

1. Install the required Python libraries: FastAPI, Tweepy, TextBlob, scikit-learn, pandas, and uvicorn.
2. Create a X Developer account.
3. Create a new application to obtain API keys
4. Use the Tweepy library to authenticate with the Twitter API.
5. Write a function to search for tweets containing a specific keyword or hashtag.
6. Fetch a specified number of recent tweets and return their text and metadata.
7. Use TextBlob or a similar NLP library to perform sentiment analysis on tweet text.
8. Define categories for sentiment (e.g., Positive, Negative, Neutral) based on the
polarity score.
9. Create a function that takes text as input and returns the sentiment category.
10. Initialize a FastAPI application.
11. Define endpoints:
    1. A root endpoint (e.g., /) to confirm the API is running.
    2. A POST endpoint (e.g., /fetch_tweets/) to accept user inputs such as keyword and number of tweets to fetch.
12. Ensure the /fetch_tweets/ endpoint integrates the tweet-fetching and sentiment analysis functions.
13. Run the API using uvicorn in development mode (--reload flag for auto-updates).
14. Use a tool like Postman, CURL, or a web browser to test:
    1. The root endpoint for a welcome message.

2. The POST endpoint by providing a sample keyword and tweet count in the request payload.

15. Verify the output includes fetched tweets with their respective sentiment analysis.

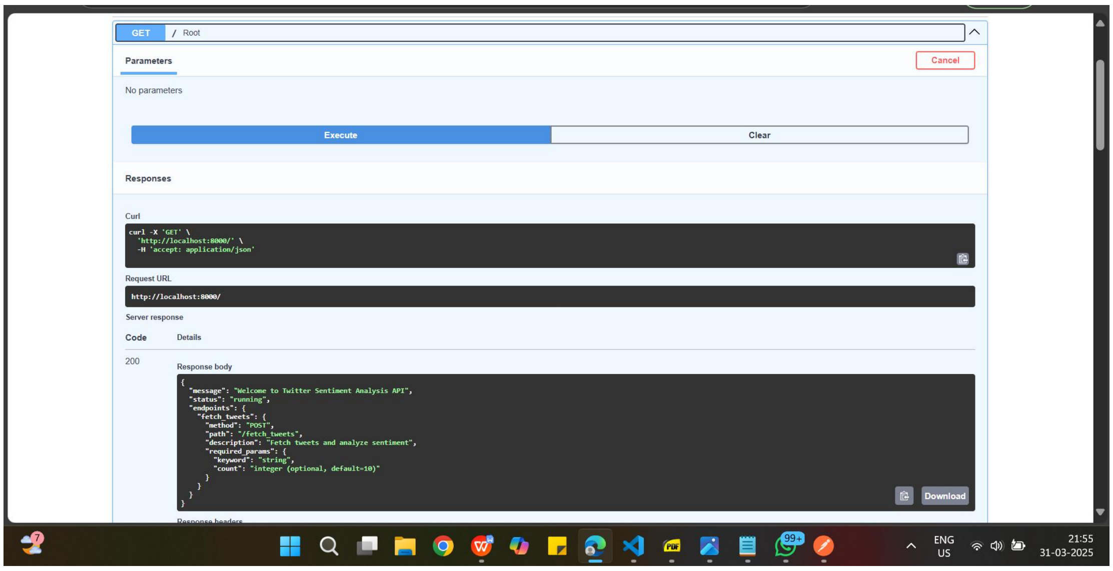
3. Code:-

main.py

```
from fastapi import FastAPI, HTTPException
from pydantic import BaseModel
import tweepy
from textblob import TextBlob
import os
from dotenv import load_dotenv
from typing import List, Dict, Optional

# Load environment variables
load_dotenv()

# Initialize FastAPI app
app = FastAPI(
    title="Twitter Sentiment Analysis API",
    description="API for fetching tweets and performing sentiment analysis",
    version="1.0.0"
)

# Twitter API credentials
TWITTER_API_KEY = os.getenv("TWITTER_API_KEY")
TWITTER_API_SECRET = os.getenv("TWITTER_API_SECRET")
TWITTER_ACCESS_TOKEN = os.getenv("TWITTER_ACCESS_TOKEN")
TWITTER_ACCESS_TOKEN_SECRET = os.getenv("TWITTER_ACCESS_TOKEN_SECRET")
TWITTER_BEARER_TOKEN = os.getenv("TWITTER_BEARER_TOKEN")

# Initialize Twitter client
client = tweepy.Client(
    bearer_token=TWITTER_BEARER_TOKEN,
    consumer_key=TWITTER_API_KEY,
    consumer_secret=TWITTER_API_SECRET,
    access_token=TWITTER_ACCESS_TOKEN,
    access_token_secret=TWITTER_ACCESS_TOKEN_SECRET
)

# Request model
class TweetRequest(BaseModel):
    keyword: str
    count: int = 10  # Default to 10 tweets if not specified

# Response models
class SentimentResult(BaseModel):
    text: str
    polarity: float
    sentiment: str  # "positive", "negative", or "neutral"
```

```
class TweetResponse(BaseModel):
    keyword: str
    count: int
    tweets: List[SentimentResult]
    positive_count: int
    negative_count: int
    neutral_count: int

# Helper function to analyze sentiment
def analyze_sentiment(text: str) -> Dict:
    analysis = TextBlob(text)
    polarity = analysis.sentiment.polarity

    if polarity > 0:
        sentiment = "positive"
    elif polarity < 0:
        sentiment = "negative"
    else:
        sentiment = "neutral"

    return {
        "text": text,
        "polarity": polarity,
        "sentiment": sentiment
    }

# Root endpoint
@app.get("/", tags=["Root"])
async def root():
    return {
        "message": "Welcome to Twitter Sentiment Analysis API",
        "status": "running",
        "endpoints": {
            "fetch_tweets": {
                "method": "POST",
                "path": "/fetch_tweets",
                "description": "Fetch tweets and analyze sentiment",
                "required_params": {
                    "keyword": "string",
                    "count": "integer (optional, default=10)"
                }
            }
        }
    }

# Fetch tweets endpoint
@app.post("/fetch_tweets", response_model=TweetResponse, tags=["Tweets"])
async def fetch_tweets(request: TweetRequest):
    try:
        # Fetch recent tweets
        tweets = client.search_recent_tweets(
            query=request.keyword,
            max_results=request.count,
            tweet_fields=["text"]
        )
        if not tweets.data:
            return {
                "keyword": request.keyword,
                "count": 0,
                "tweets": [],
                "positive_count": 0,
                "negative_count": 0,
                "neutral_count": 0
            }

        # Analyze sentiment for each tweet
        analyzed_tweets = []
        positive_count = 0
        negative_count = 0
        neutral_count = 0

        for tweet in tweets.data:
            result = analyze_sentiment(tweet.text)
            analyzed_tweets.append(result)

            # Count sentiments
            if result["sentiment"] == "positive":
                positive_count += 1
            elif result["sentiment"] == "negative":
                negative_count += 1
            else:
                neutral_count += 1

        return {
            "keyword": request.keyword,
            "count": len(analyzed_tweets),
            "tweets": analyzed_tweets,
            "positive_count": positive_count,
            "negative_count": negative_count,
            "neutral_count": neutral_count
        }

    except tweepy.TweepyException as e:
        raise HTTPException(status_code=400, detail=f"Twitter API error: {str(e)}")
    except Exception as e:
        raise HTTPException(status_code=500, detail=f"An error occurred: {str(e)}")

if __name__ == "__main__":
    import uvicorn
    uvicorn.run(app, host="0.0.0.0", port=8000)
```

4. Results/Output:-



No parameters

Responses

Curl

```
curl -X 'GET' \
  'http://localhost:8000/' \
  -H 'accept: application/json'
```

Request URL

```
http://localhost:8000/
```

Server response

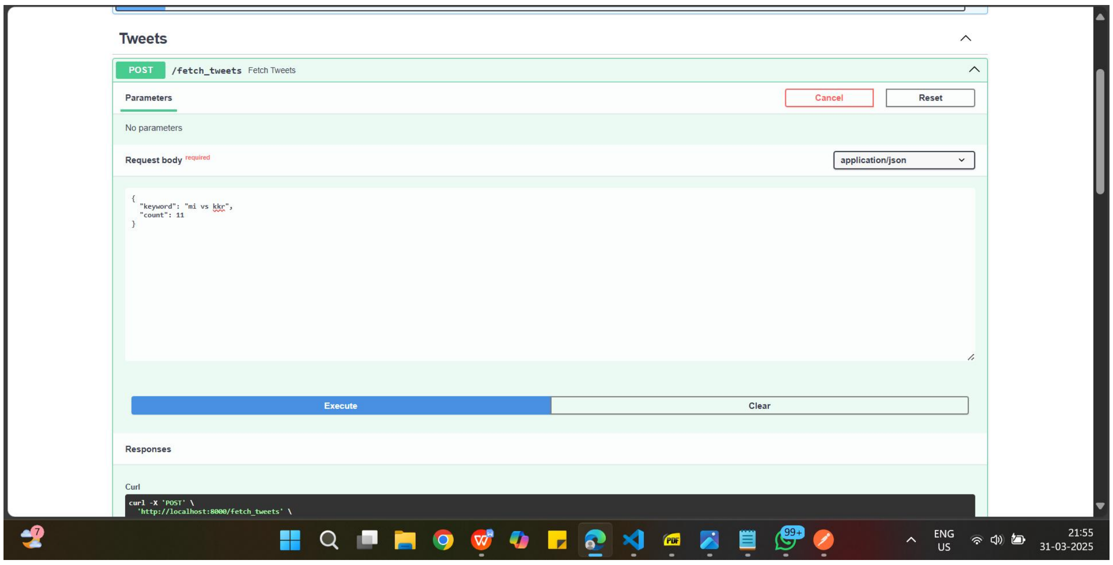
Code Details

200

Response body

```
{
  "message": "Welcome to Twitter Sentiment Analysis API",
  "status": "running",
  "endpoints": {
    "fetch_tweets": {
      "method": "POST",
      "path": "/fetch_tweets",
      "description": "Fetch tweets and analyze sentiment",
      "required_params": {
        "keyword": "string",
        "count": "integer (optional, default=10)"
      }
    }
  }
}
```

Response headers



No parameters

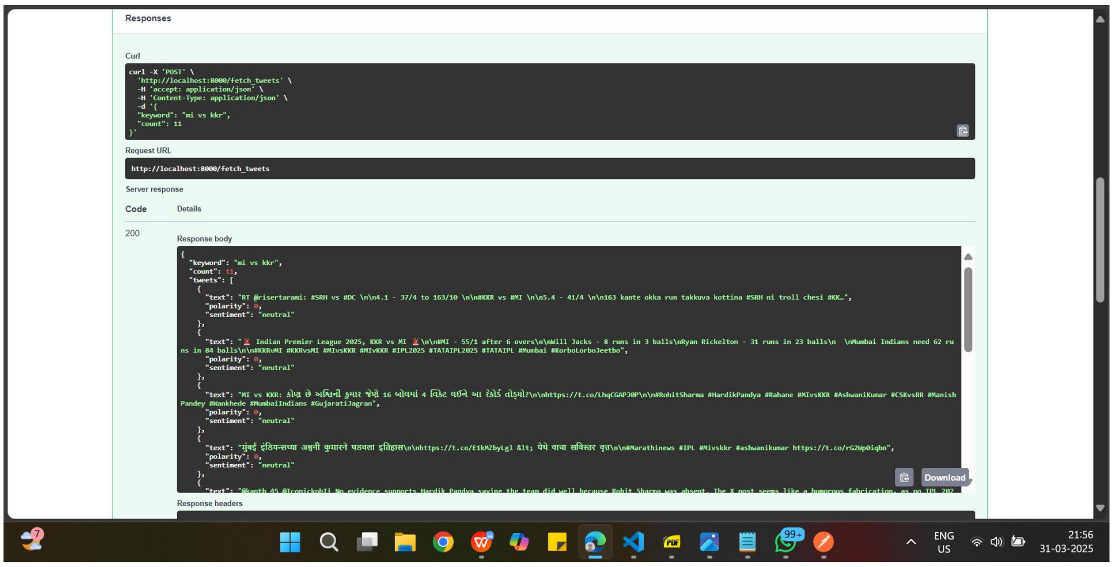
Request body required

```
{
  "keyword": "mi vs kkr",
  "count": 11
}
```

Responses

Curl

```
curl -X 'POST' \
  'http://localhost:8000/fetch_tweets' \
```



Curl

```
curl -X 'POST' \
  'http://localhost:8000/fetch_tweets' \
  -H 'accept: application/json' \
  -H 'Content-Type: application/json' \
  -d '{
  "keyword": "mi vs kkr",
  "count": 11
}'
```

Request URL

```
http://localhost:8000/fetch_tweets
```

Server response

Code Details

200 Response body

```
{
  "keyword": "mi vs kkr",
  "count": 11,
  "tweets": [
    {
      "text": "RT @risertarami: #SRH vs #DC \n\n4.1 - 37/4 to 163/10 \n\n#KKR vs #MI \n\n5.4 - 41/4 \n\n163 kante okka run takkuva kottina #SRH ni troll chesi #KK…",
      "polarity": 0,
      "sentiment": "neutral"
    },
    {
      "text": "🚨 Indian Premier League 2025, KKR vs MI 🚨\n\n#MI - 55/1 after 6 overs\n\nWill Jacks - 8 runs in 3 balls\nRyan Rickelton - 31 runs in 23 balls\n  \nMumbai Indians need 62 ru
ns in 84 balls\n\n#KKRvMI #KKRvsMI #MIvsKKR #MIvKKR #IPL2025 #TATAIPL2025 #TATAIPL #Mumbai #KorboLorboJeetbo",
      "polarity": 0,
      "sentiment": "neutral"
    },
    {
      "text": "MI vs KKR: કોણ છે અશ્વિની કુમાર જેણે 16 બોલમાં 4 વિકેટ લઈને આ રેકોર્ડ તોડ્યો?\n\nhttps://t.co/LhqCGAPJ0P\n\n#RohitSharma #HardikPandya #Rahane #MIvsKKR #AshwaniKumar #CSKvsRR #Manish
Pandey #Wankhede #MumbaiIndians #GujaratiJagran",
      "polarity": 0,
      "sentiment": "neutral"
    },
    {
      "text": "मुंबई इंडियन्सच्या अश्वनी कुमारने घडवला इतिहास\n\nhttps://t.co/E1kMZbyLgl &lt; येथे वाचा सविस्तर वृत्त\n\n#Marathinews #IPL #Mivskkr #ashwanikumar https://t.co/rG2Wp0iqbn",
      "polarity": 0,
      "sentiment": "neutral"
    },
    {
      "text": "@kanth_45 @Iconickohli No evidence supports Hardik Pandya saving the team did well because Rohit Sharma was absent. The X post seems like a humorous fabrication, as no IPL 202
```

Response headers

5. Remarks:-

Signature of the Student
_Bhairav Ganguly
(Name of the Student)

Signature of the Lab Coordinator

(Name of the Coordinator)