DS3002 – Data Project 2

25 points Due May 7th at 12 PM

The goal of the second data project, building upon the first project, is to further demonstrate (1) an understanding of and (2) competence creating and implementing basic data science systems such as pipelines, scripts, data transformations, containers, APIs, databases and cloud services. Submit your project in your Git Repo or file drop on Collab.

Projects done in pairs or individually.

Select 2 projects:

Data Ingestion & Analysis

- Data ingestion & analysis
- Twitter bot
- Discord bot
- Trading Algo

Data Ingestion and analysis:

Deliverable: Write and deploy a process that executes *exactly* once every minute, retrieving data from a remote API (provided for you) and write all retrieved values to a database for 60 minutes. Using code- based data analysis techniques against the database, try to (i) describe any patterns or changes in the data over time; and (ii) explain the logic of these changes.

The remote data API can be found here:

https://4feaquhyai.execute-api.us-east-1.amazonaws.com/api/pi

Benchmarks:

1. Your solution must execute precisely once per minute at the same time each minute. (You should not use a sleep 60 command to simply "wait" between executions or other methods that will drift over time.) Therefore, your solution must be designed carefully.
2. Your solution must run for exactly one hour, starting at 00 minutes and finishing at 59 minutes. The API is available 24/7 for such testing.
3. Your solution will retrieve all data fields from an API and write them to the database of your choice and design – relational or NoSQL.
4. Submit all code in a standalone GitHub repository in your account.

5. Your analysis should look at the relationship between all data fields and their changes over time. In a brief statement, describe any changes or patterns you observe, and propose an explanation for them. Include this in your GitHub repository.
6. You should also provide text output or a screenshot of your database table verifying consistent execution of your code each minute. Include this in your Github repository.

Grading:

- ☐ Successful deployment – 10 points.
- ☐ Functionality that meets all benchmarks – 12 points.
- ☐ Documentation – Describe your process, code, deployment strategy – 3 points.

Twitter Bot

Deliverable: Write an interactive, Twitter-based bot account that can receive and parse Tweets sent to it and returns a data-driven reply. This will involve creating a Twitter Developer account (free), and setting up your own Python-based API that is connected to that account. While responses or actions can be triggered by a variety of Twitter actions (DMs, replies, etc.) this project requires a reply only to basic tweets sent to your bot. Replies should relate to the message sent to your bot, and should integrate at least one external data source (an API or database). The API backing your bot could be a container running in Lightsail, on EC2, the API Gateway + Lambda, or another solution of your choice.

Your bot does not have to be "serious" – for instance it could play a game or quiz, but the seriousness should be found in how your application handles data, performs remote data retrievals and processes user requests.

Blog posts and documentation can help you get started:

• https://realpython.com/twitter-bot-python-tweepy/ • https://developer.twitter.com/

Machine learning and NLP would be employed in a deeper bot model, but those are not required here. But explore those options if you like!

Benchmarks:

1. Your bot should reply promptly with an intelligent response or an informative error message.
2. Your bot should recognize a "help" or "info" message and return user instructions.
3. Your bot should integrate with at least one external data source that you can document

   and

   describe. This could be a database system or API.

4. Submit all code in a standalone GitHub repository in your account.
5. Submit the twitter account handle for testing/grading in your repo.

Grading:

☐Successful deployment of your API to Lightsail, an EC2 instance, or AWS Lambda + API Gateway – 10 points

☐ Functionality that meets all benchmarks – 10 points
☐ Creativity / Innovation / Quality – 2 points
☐ Documentation – Describe how to use the bot and the elements that make it operational. – 3

points.

Discord Bot

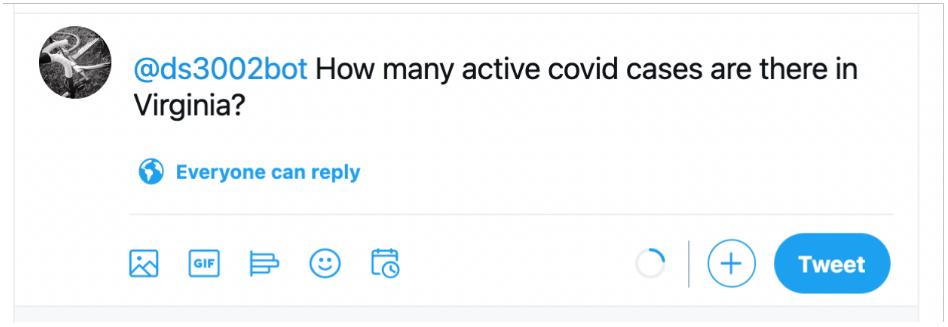
Deliverable: Create and publish an interactive Discord bot in a test server (provided for you by the instructor). Unlike a Twitter bot that simply parses and replies to messages sent to it, Discord bots can have much more functionality. For instance, they can have a wide variety of commands that users can invoke in channels as well as in direct messages with the bot.

Like a Twitter bot, a Discord bot must be backed by a Python-backed application that runs actively with an open connection to the Discord activity API and is invoked by bot commands and messages. You must write and publish this app, and it should connect to at least one external data source such as an external API or a database for some of its possible interactions.

Your bot does not have to be "serious" – for instance it could play a game or quiz, but the seriousness will be found in how your application handles data, performs remote retrieval and processing of requests and replies.

There are many good resources to show you how to set up a Discord bot:

- https://realpython.com/how-to-make-a-discord-bot-python/
- https://www.freecodecamp.org/news/create-a-discord-bot-with-python/



@ds3002bot How many active covid cases are there in Virginia?

- https://discord.com/developers/docs/intro
- https://top.gg/
- Complete multi-part video series:

  https://www.youtube.com/playlist?list=PL W3GfRiBCHOhfVoiDZpSz8SM_HybXRPzZ

Benchmarks:

1. Your bot should recognize a "help" message and reply with user instructions.
2. Your bot should provide at least three commands or functions.
3. Your bot should reply promptly with an intelligent response or an informative error

   message.

4. Your bot should integrate with at least one external data source that you can document

   and

   describe. This could be a database system or API.

5. Submit all code in a standalone GitHub repository in your account.

Grading:

☐ Successful build of the bot and API solution using Lightsail or EC2 or Repl.it (recommended)– 10 points
☐ Functionality that meets all benchmarks – 10 points
☐ Creativity / Innovation / Quality – 2 points
☐ Documentation – Describes how to use the bot and the elements that make it operational 3 points

Basic Trading Algo:

Deliverable: Create and publish trading algo that can paper trade on Alpaca or WebBull,or CryptoHopper for AltCoin a free, paper trading platform (or real life).

1. You machine should be able to authenticate and gain basic integration with the trading platform: 1. Balances 2. Current Positions
2. Your machine will be able to execute buy and sell orders at the command line
3. Your machine will be able to automatically trade based on the algorithm you build into the code. Research different trading algorithms. You can hard code these with variables to tweak or (better) store the roles in JSON files so you can track what works.
4. When trades are executed, you write the to a JSON File.
5. Host this on Repl.it or EC2/lightsail.

Submit all code in a standalone GitHub rep

Grading:

- ☐ Successful build a solution using Lightsail or EC2 or Repl.it (recommended)– 10 points
- ☐ Functionality that meets all benchmarks – 10 points
- ☐ Creativity / Innovation / Quality – 2 points
- ☐ Documentation – Describes how to use the bot and the elements that make it operational –

https://www.cryptohopper.com/features/paper-trading

https://alpaca.markets
https://replit.com

Publicly-available datasets:

• https://www.kaggle.com/datasets • https://data.world/

• https://www.data.gov/
• https://opendata.charlottesville.org/

Publicly-available APIs:

• https://docs.github.com/en/rest
• https://developer.twitter.com/en/docs/twitter-api
• HUGE LIST: https://github.com/public-apis/public-apis