Listen To Your Weather

[Final Presentation]

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Group 35

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Motivation and Novelty

This is an app to:

- **Observe** how your playlist react to different weathers ahead of time

- **Share** your unique playlist with your friends and families

- **Gain** the sense of having a music bosom friend from personalized recommendation

We are the first one:

- Utilizing pure machine learning models to make temperature predictions.

- Constructing hourly ahead open source temperature-based playlist generator

Business Values

- Market gap: There is no same product so far!

- User demand:

    - Real time prediction and customized playlist recommendation every hour
    - Obtaining different customized playlist and sharing with friends

- Prospect:

    - Being Integrated into popular weather forecast apps and boosting their CTR
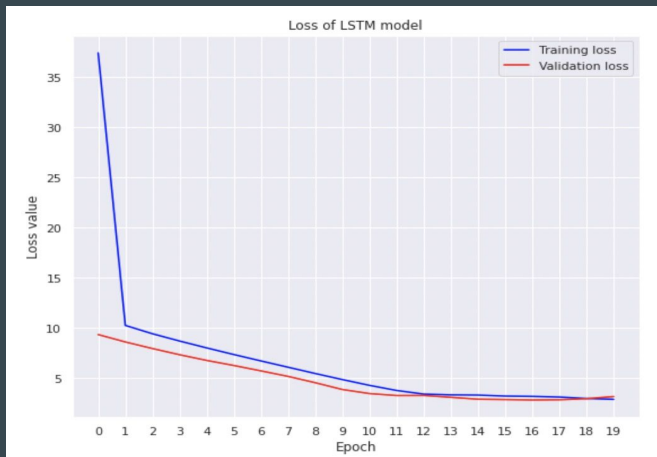
System
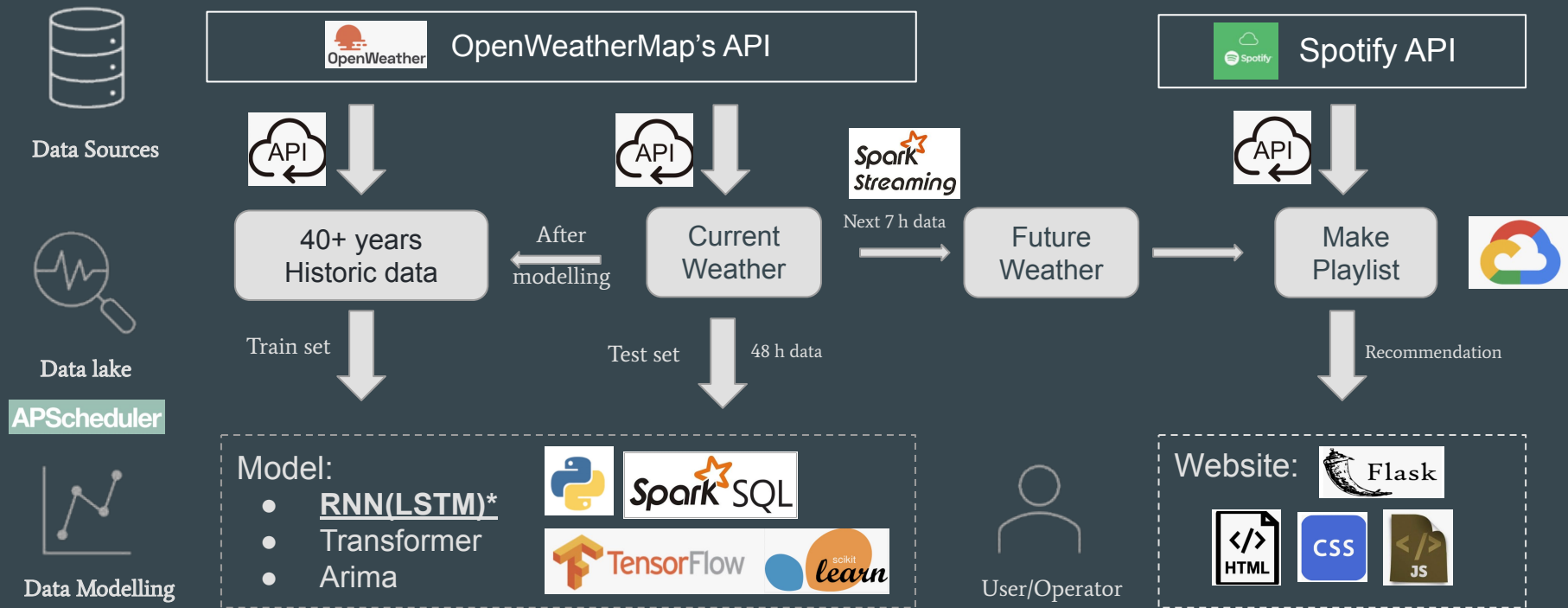
RNN(LSTM): Final deployed model for both temperature prediction and weather type prediction

Weather forecast

- **RNN-LSTM** (performs better than ARIMA and Transformer)
- **Train models based on hourly weather data in New York in the past 20 years**
  (Features-used: Temperature, Day, Month, Pressure, Wind Speed, Weather Type)
- **Predict temperature and weather types**

Loss of temperature regression model

Loss of weather type classification model

Data Streaming

Music Recommendation

OpenWeather

past 48h weather

Spark Streaming

processed data

LSTM

℃ & type for 7h

Spotify for Developers

customized playlist

Front end / User

Log in with Spotify → Get user's top tracks (or current global hits)

future weather

weight matrix for audio features:

Calculation & Sorting

Post playlist to user ← Get recommendations

seed entity
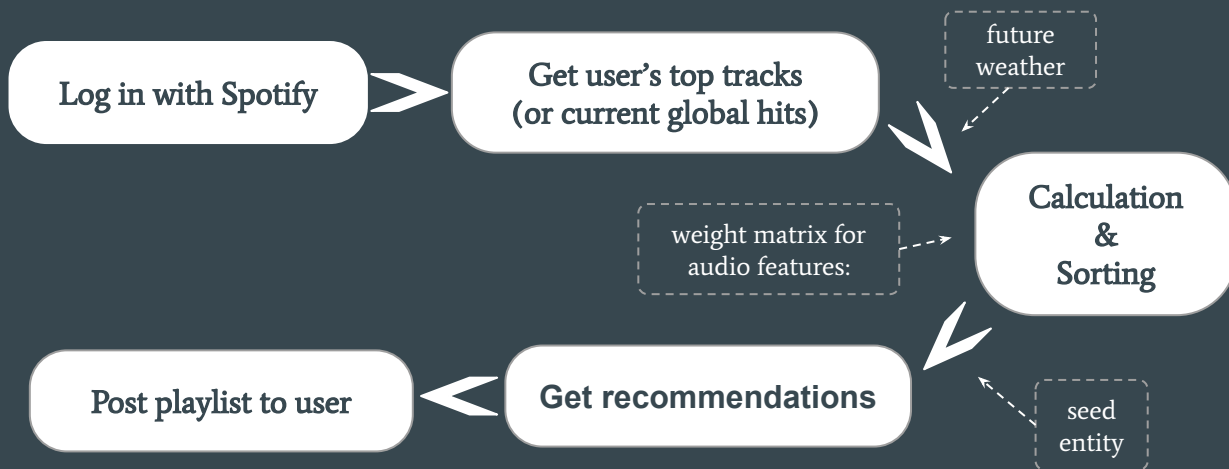
- Top tracks: based on historic record and calculated affinity
- Audio Features: danceability, acousticness, instrumentalness, valence, energy
- New user for Spotify: recommended by global hits, which update everyday
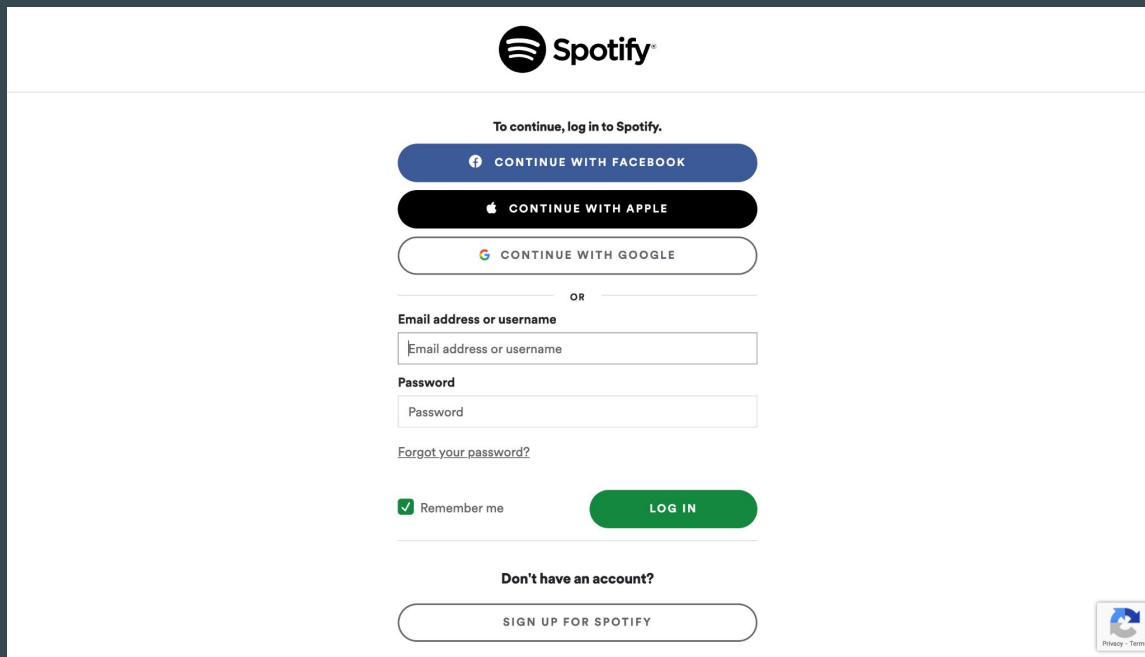
Front End

- Display current weather and forecast weather in the next 7 hours.
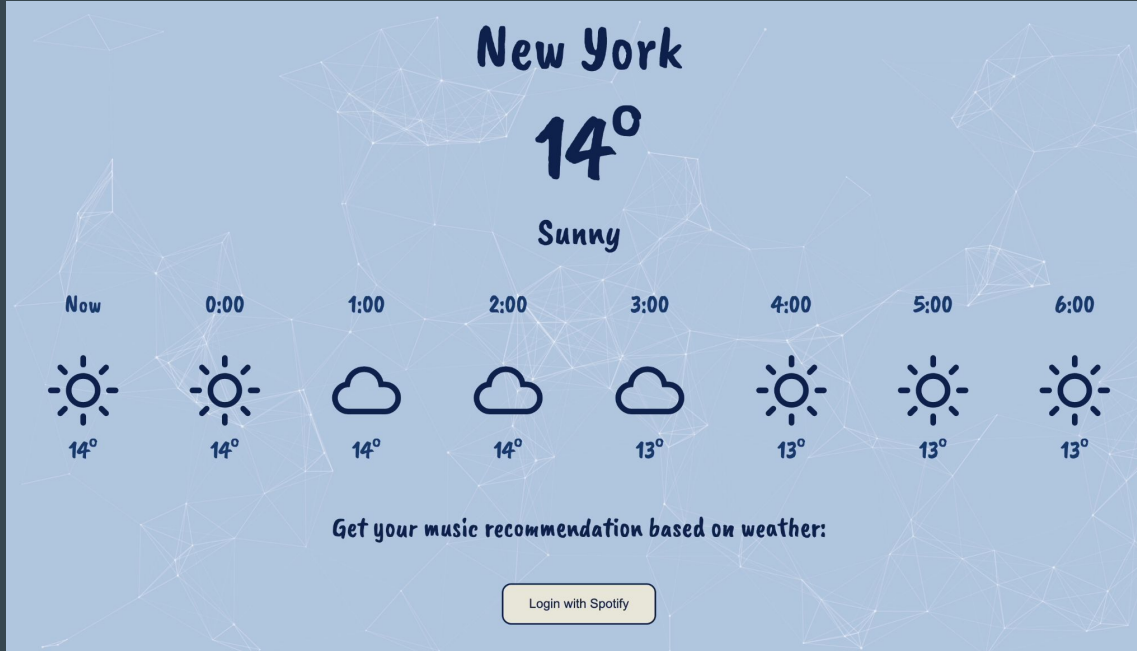
Front End

- Users need to log in with their spotify.

Front End

- A personalized playlist is recommended to the user.
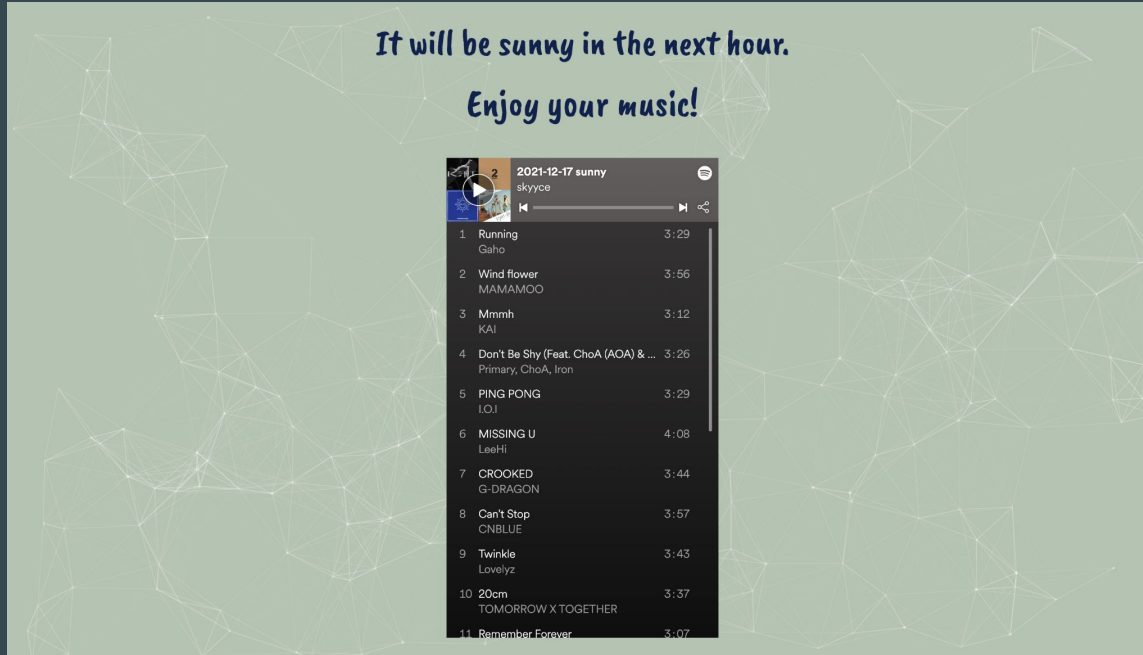
Big data challenge:

- **Volume**:

  Historical weather data for over 40 years deep and more than 400,000 observations with 1-hour step

  <u>Soln</u>: Only used in training process, and due to the large size,1 hour data is trivial to be included into training set after being observed.
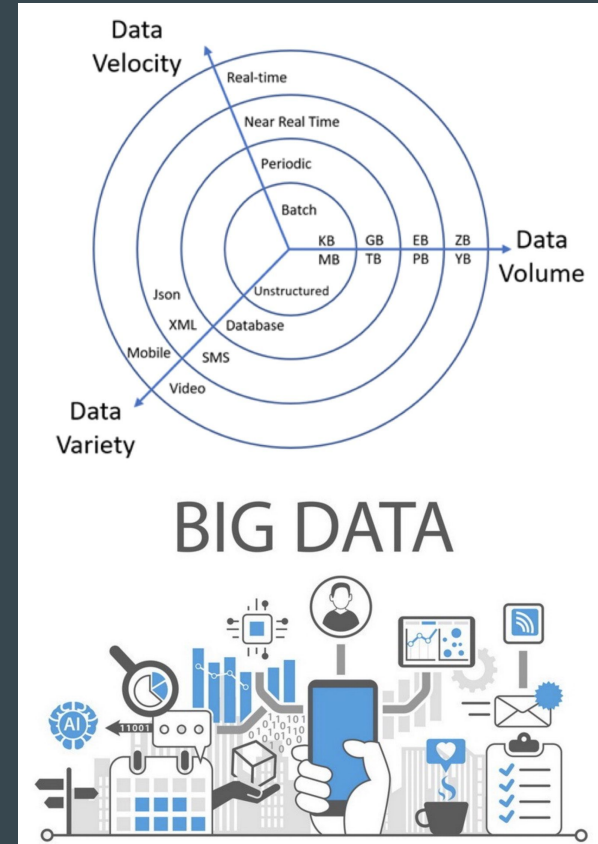
- **Velocity:**

  Achieving real-time updations of weather prediction per hour

  <u>Soln</u>: Save model in advance, schedule fetching predictions at the beginning of each hour and store them before running web.

- **Variety:**

  Music data is unstructured, while others are structured data

  <u>Soln</u>: Using spotify API to access and pass json data

To be improved

- **Prediction Model:**

  - Add additional weather features for training

  - Adjust architectures and hyperparameters

- **Music Recommendation:**

  - Determine weights for audio features by training models if data is available

- **User Experience:**

  - Add an option for users to choose locations

  - Add options for users to choose their moods or what they are doing

Thanks for watching

References

- https://github.com/Eligijus112/Vilnius-weather-LSTM

- https://openweathermap.org/current

- https://developer.spotify.com/documentation/web-api/

- Dsr A . Forecasting The Air Temperature at a Weather Station Using Deep Neural Networks[J]. Procedia Computer Science, 2020, 178:38-46.

- Bilgin O , Mka P , Vergutz T , et al. TENT: Tensorized Encoder Transformer for Temperature Forecasting[J]. 2021.