CAPSTONE SPRINT 3:

Unpredictable Vancouver Weather Predicted with Data Science.

Why is it so hot or cold without warning?

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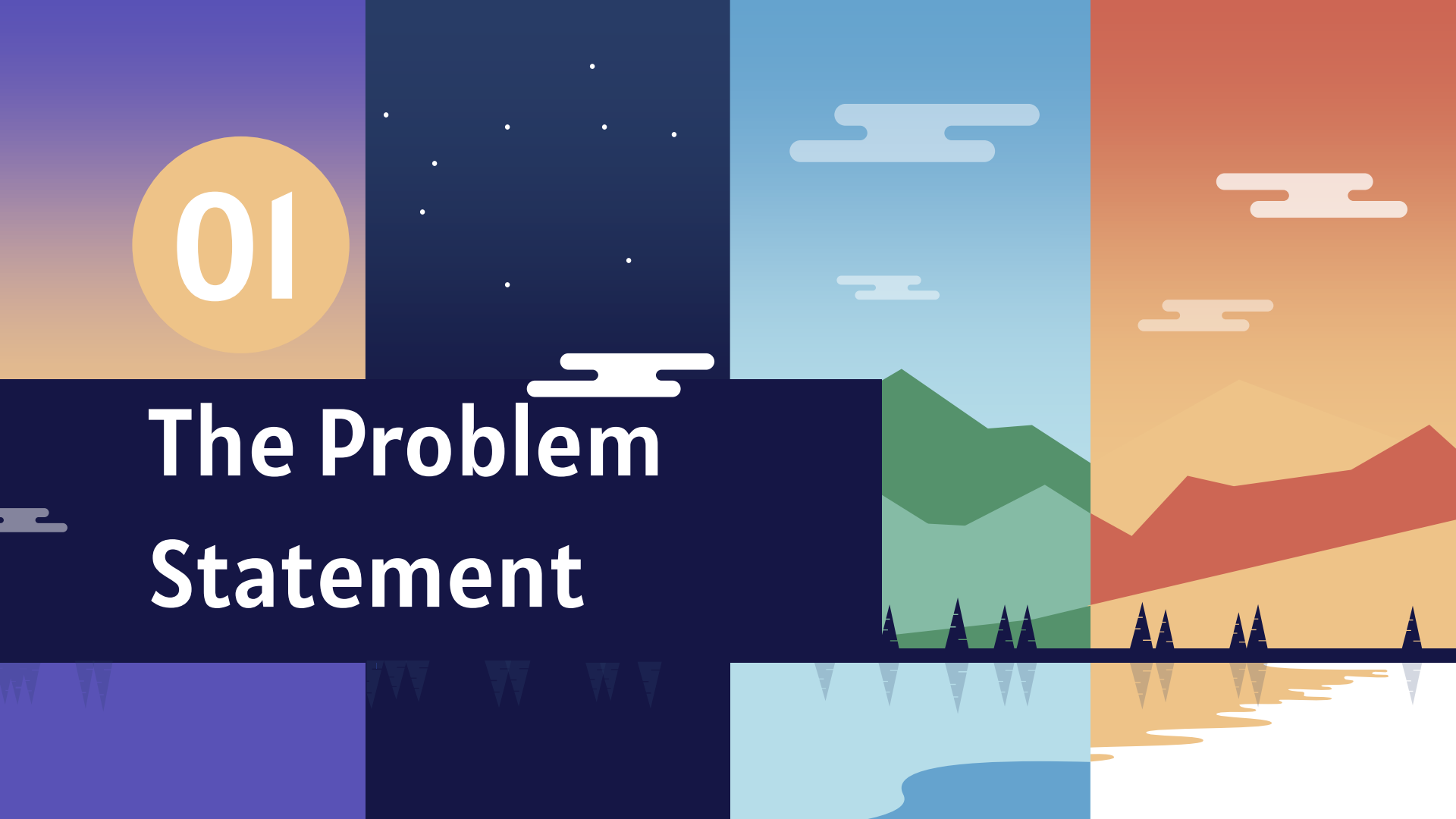

01
The Problem Statement

How can we better predict high and low temperatures?

Based solely on the weather statistics already available, can Machine Learning be used to predict a day with very hot or very cold weather?

Solution: Use LSTM to train a model on the weather statistics and predict the temperature.

Potential Impact:

- Help people be more prepared
- Help businesses sell seasonal products


02
Dataset and
Preprocessing

https://vancouver.weatherstats.ca/

Data Overview:

Hourly Vancouver Weather Statistics (July 1st, 2013 - June 30, 2023)

1. Filling null values
2. Feature Engineering for EDA
3. Feature Selection through EDA

date_time_local	pressure_station	pressure_sea	wind_dir	wind_speed	wind_gust	relative_humidity	dew_point	temperature	windchill	humidex	visibility
2013-07-01 00:00:00	101.18	101.16	SSE	7	0.0	91	18.2	19.7	0.0	0.0	32200.0
2013-07-01 01:00:00	101.22	101.21	SE	6	0.0	89	17.8	19.6	0.0	0.0	32200.0
2013-07-01 02:00:00	101.26	101.24	E	11	0.0	88	16.7	18.7	0.0	0.0	32200.0
2013-07-01 03:00:00	101.26	101.25	E	4	0.0	84	16.5	19.2	0.0	0.0	32200.0
2013-07-01 04:00:00	101.30	101.28	NNW	5	0.0	87	15.7	17.9	0.0	0.0	32200.0


03
Key Insights

Highest and Lowest Air Temperatures

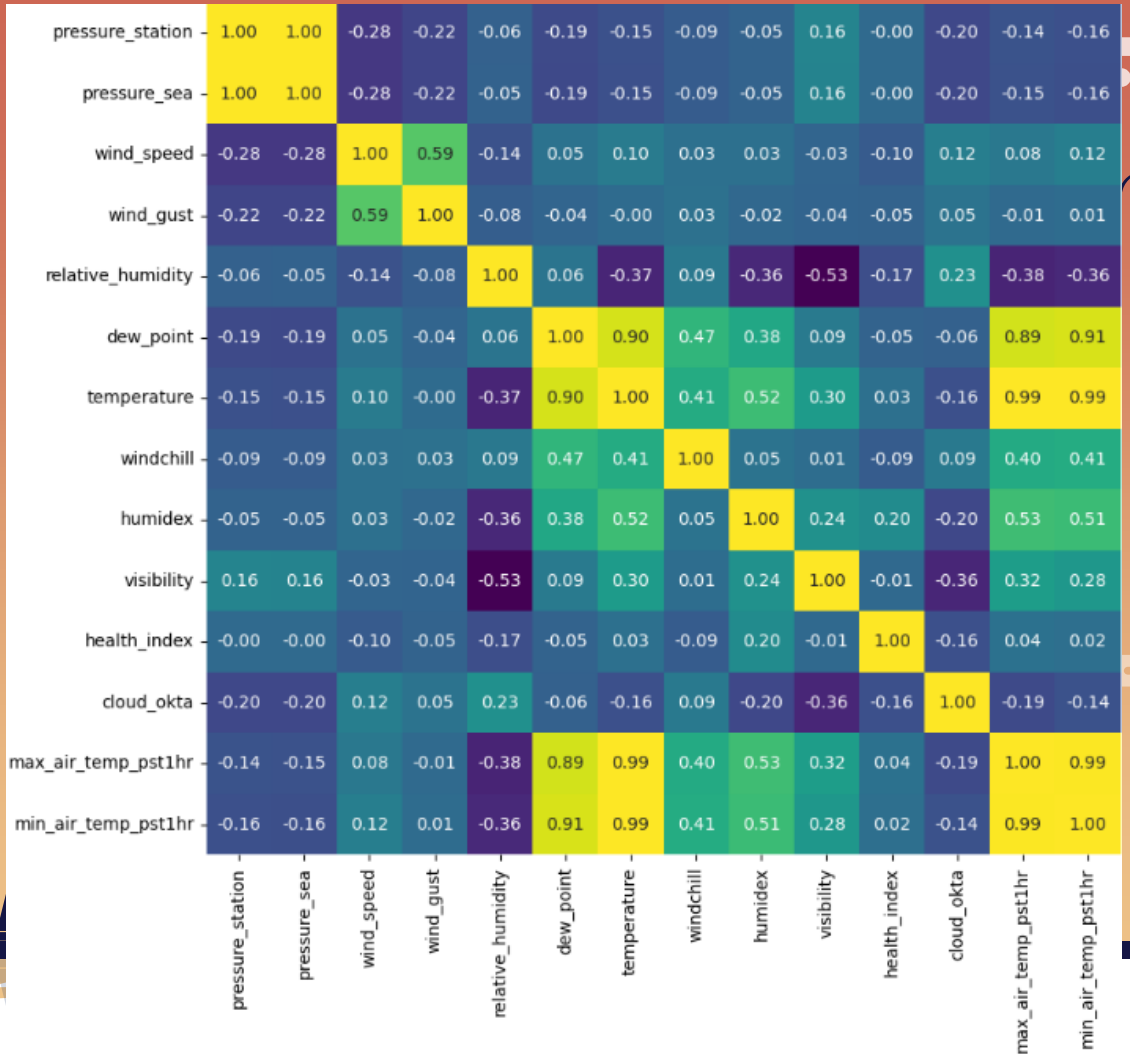
Lowest temperature in the past 10 years:

--15.3°C(not -14.5°C)
December 27, 2021, at 05:00

Highest temperature in the past 10 years:

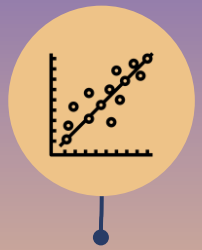
32.6°C (not 32.1°C)
June 29, 2021, at 15:00

Little to no Correlation to Temperature




04
Model Comparison /
Interpretation

Models Fitted to Data

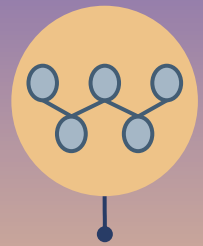


Linear Regression

R^2 = 99.64%
MAPE = 7.22%

FB Prophet

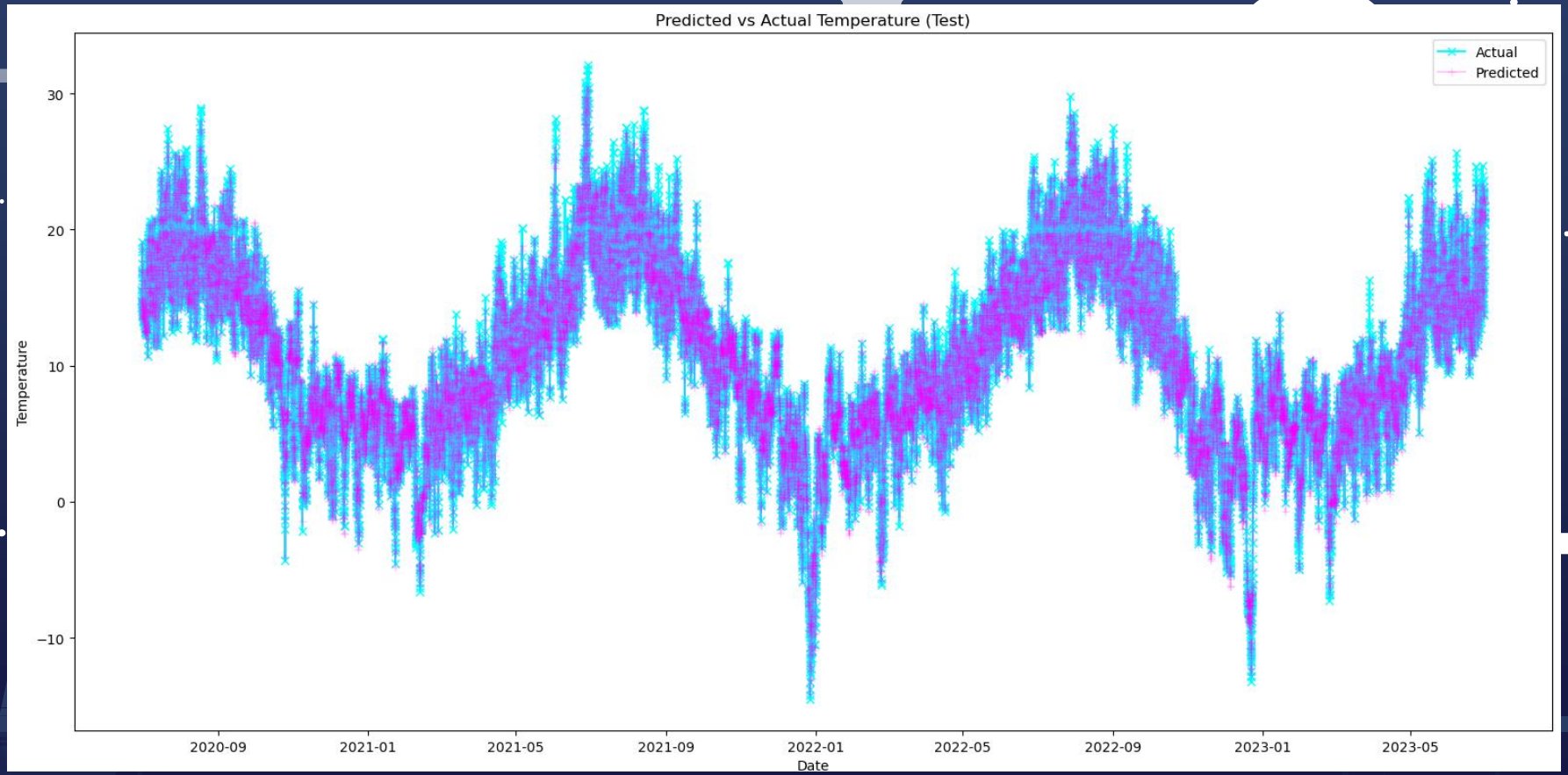
R^2 = 99.53%
MAPE = 8.33%



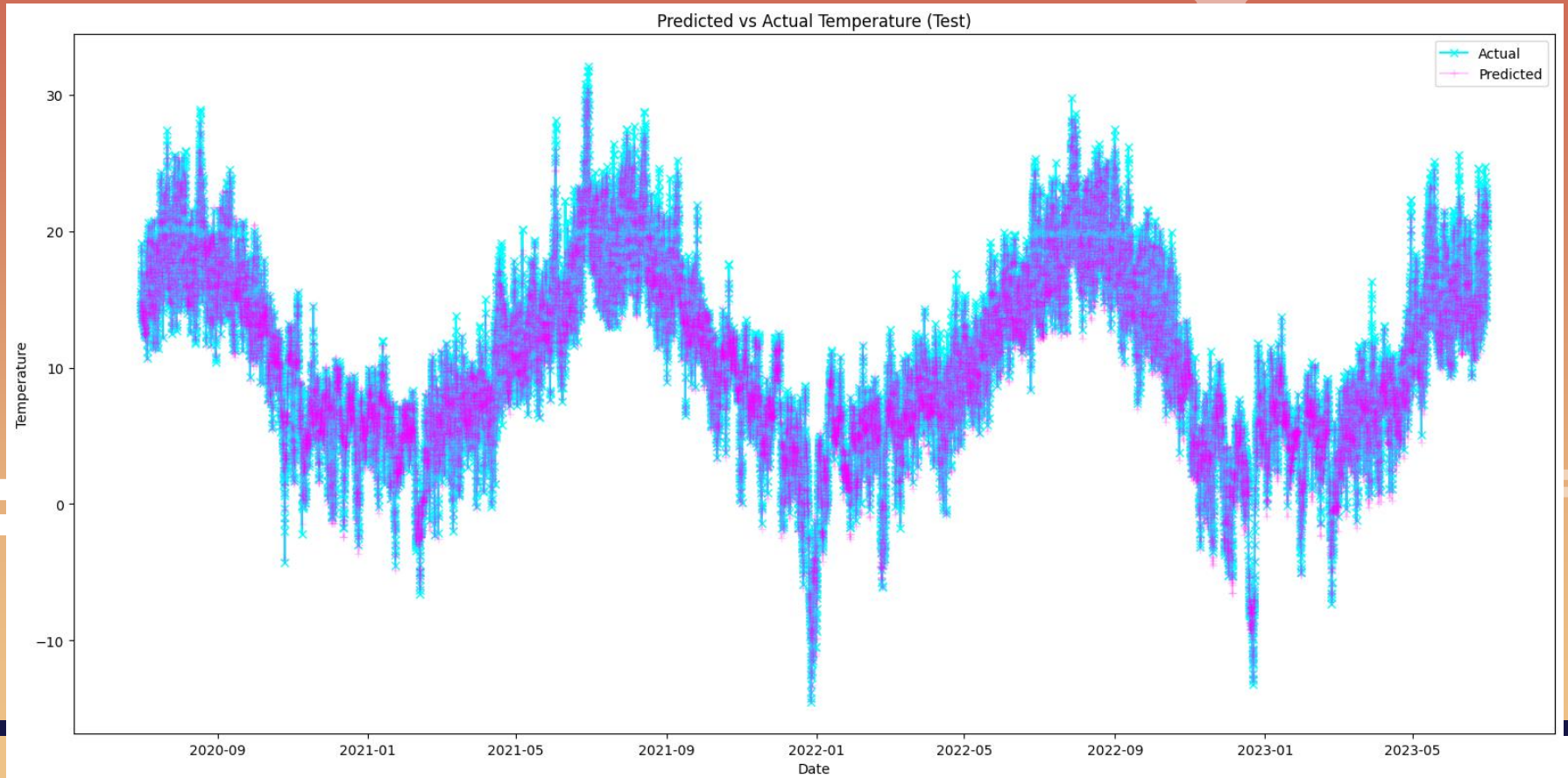
LSTM

R^2 = 99.96%
RMSE = 7.22%

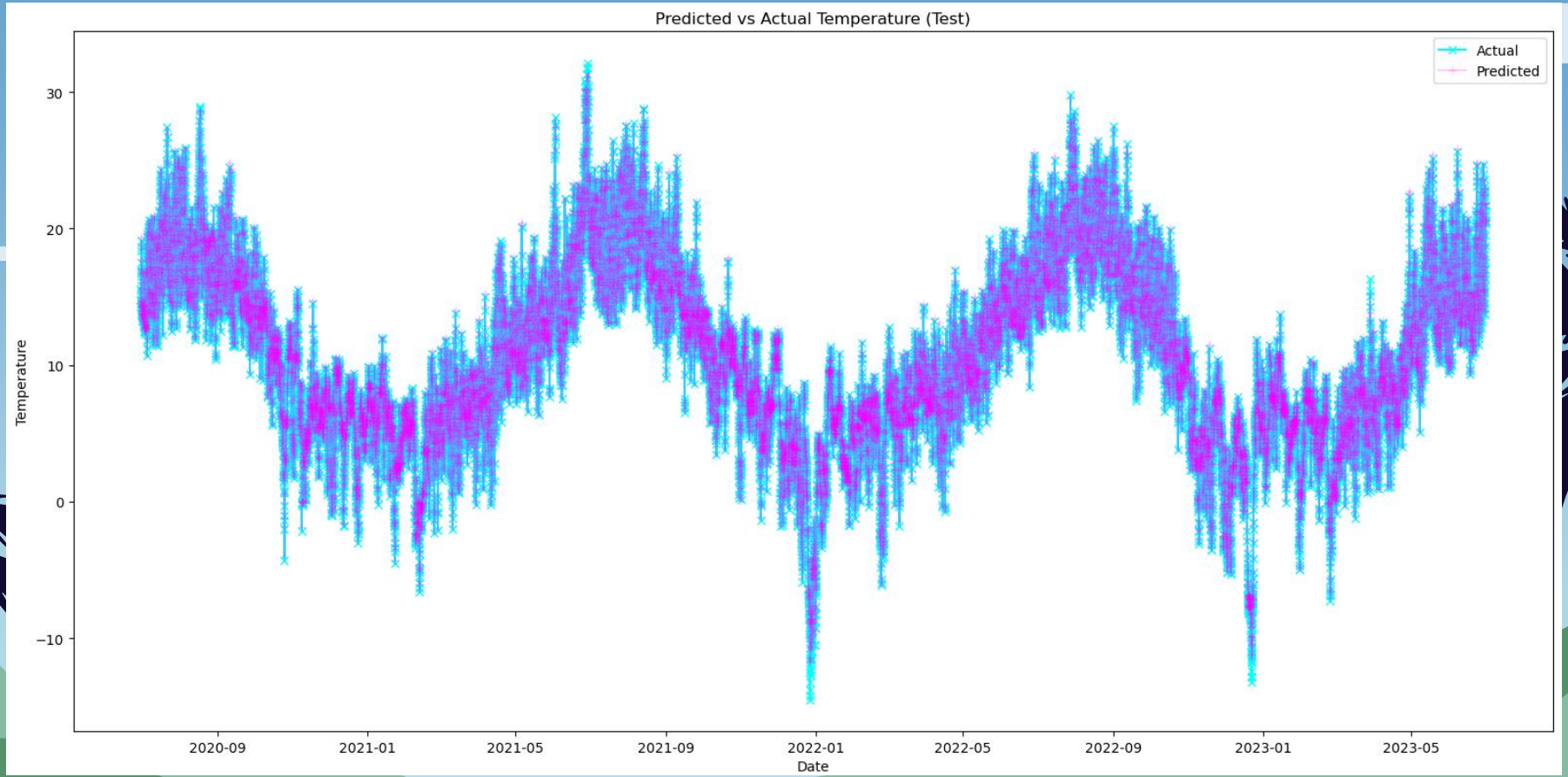
Linear Regression



Prophet


Predicted vs Actual Temperature (Test)
Actual
Predicted
Temperature
30
20
10
0
−10
2020-09
2021-01
2021-05
2021-09
2022-01
2022-05
2022-09
2023-01
2023-05
Date

LSTM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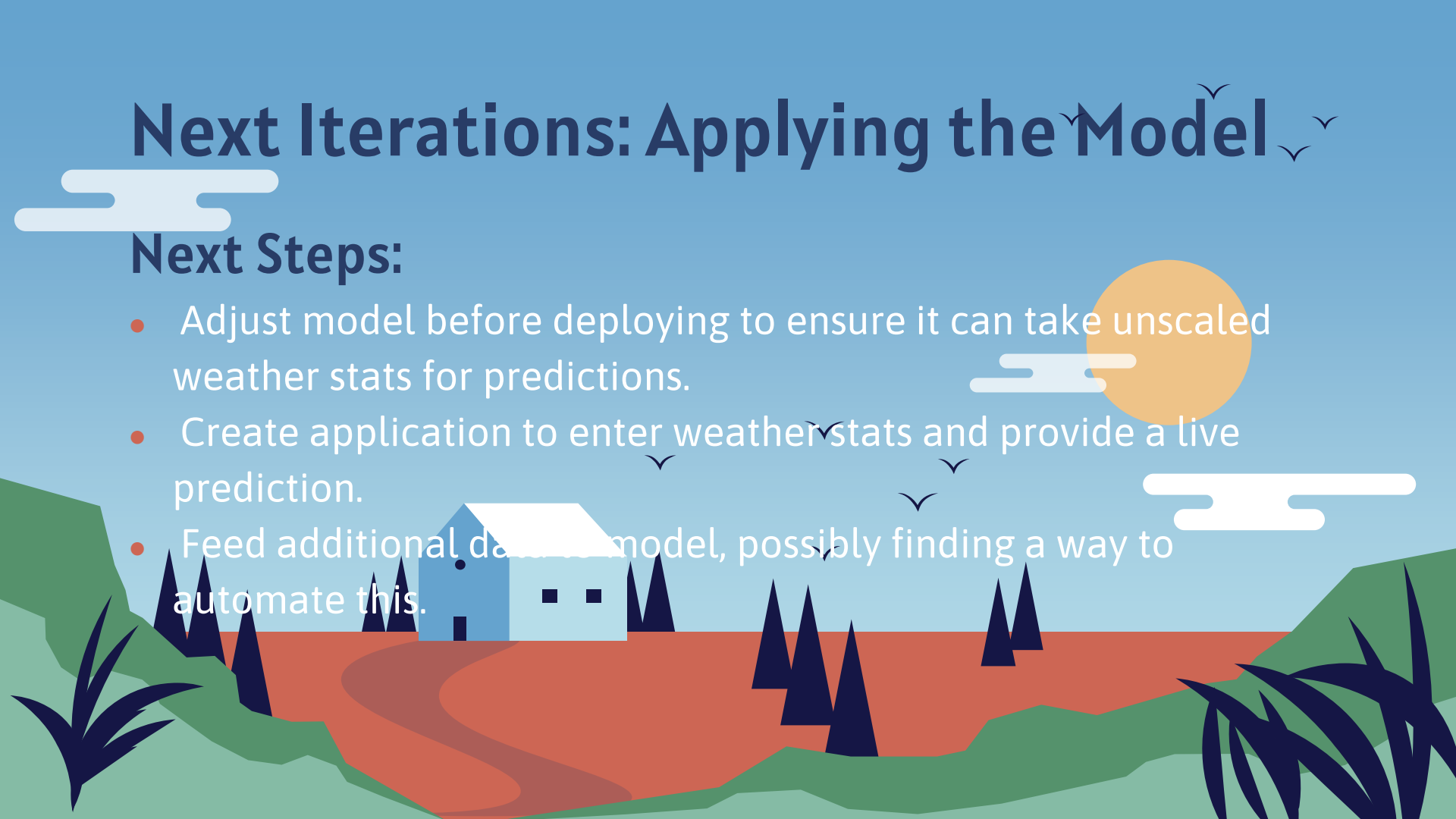
2022-05
2022-09
2023-01
2023-05
Date


05
Next Steps

Next Iterations: Applying the Model

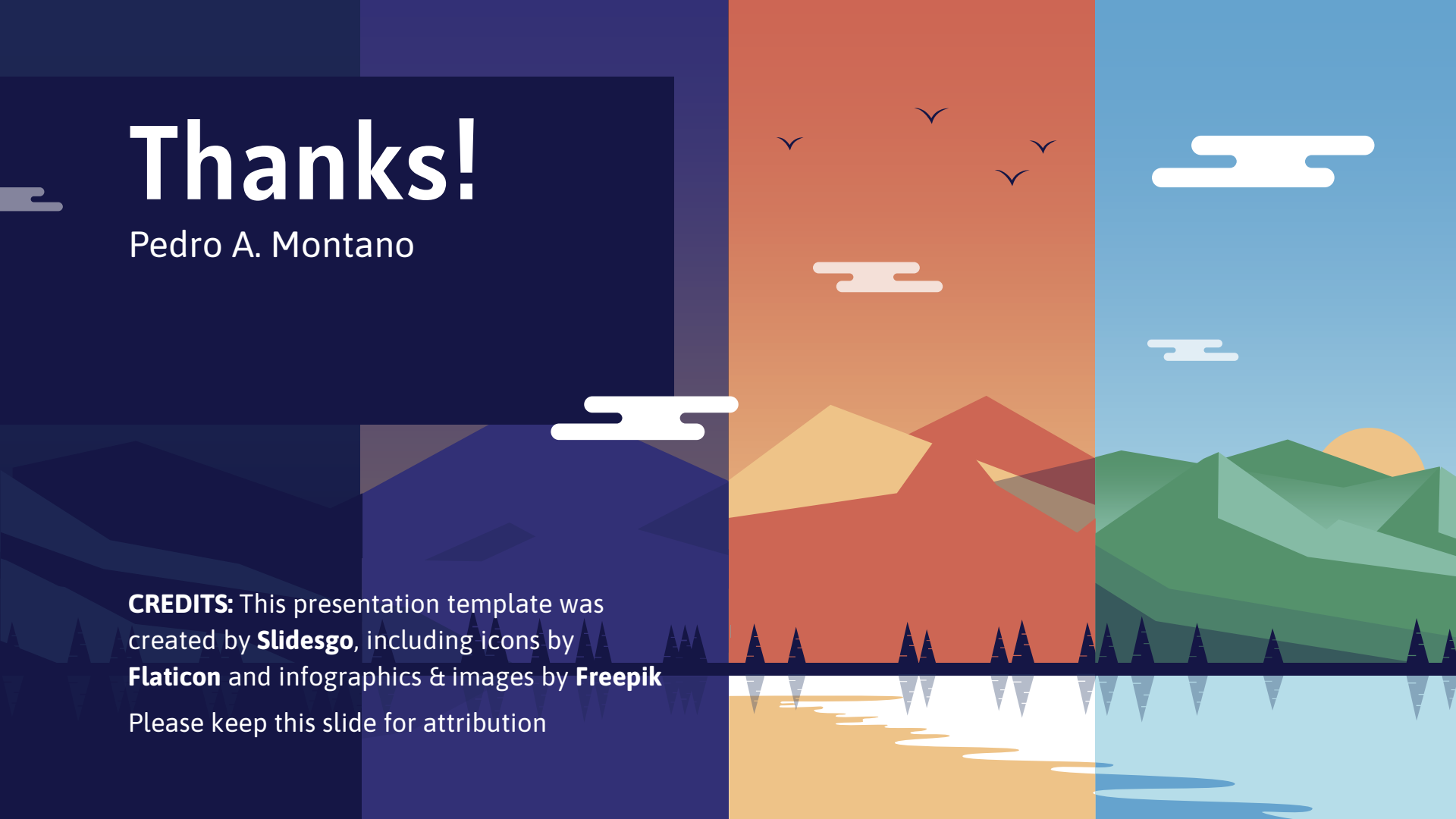
Next Steps:

- Adjust model before deploying to ensure it can take unscaled weather stats for predictions.
- Create application to enter weather stats and provide a live prediction.
- Feed additional data to model, possibly finding a way to automate this.



Thanks!

Pedro A. Montano



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