AI Boot Camp

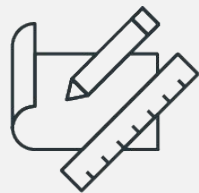# Time Series Forecasting with Prophet

Module 8 Day 3

Class Objectives

By the end of class, you will be able to:

1. Use Prophet for time series forecasting.

2. Interpret the forecasting results for decision-making.

3. Apply advanced time series forecasting models by using Prophet.

Welcome

Time Series Forecasting with

PROPHET

It's time to predict the future with Prophet!

Time Series Forecasting with Prophet

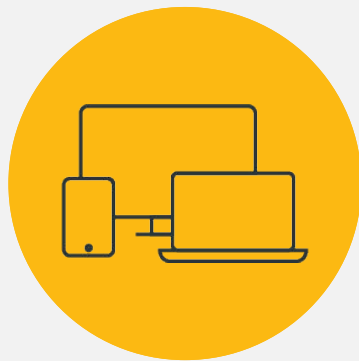Here are the basic steps:

01 Create a Prophet model.

02 Fit the Prophet model.

03 Create a DataFrame to hold predictions.

04 Build a table of predictions.

Instructor **Demonstration**

Time Series Forecasting with Prophet

In-Sample vs. Out-of-Sample Predictions

We can use the `future` DataFrame to make predictions for the data that we already have and the data that we haven't gotten yet.

In-sample predictions

Predictions that we make for the data that the model was originally trained on.

Out-of-sample predictions

Predictions about data that we haven't yet received—predictions about the future.

Questions?

Activity:

Forecasting Market Opportunities with Prophet

In this activity, you will use time series forecasting to analyze Google Trends data.
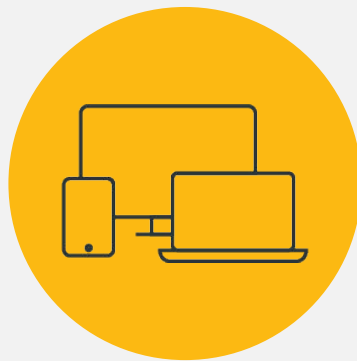
Suggested time:

20 minutes

Time's up!
Let's review

Questions?

Instructor **Demonstration**

Interpreting Prophet Forecasts for Decision-Making

Interpreting Prophet Forecasts for Decision-Making

We will learn how to visualize Prophet forecasts and interpret the results.

Here are the basic steps:

- Read the forecast results.

- Plot the upper and lower bounds of the forecast.

- Break down the forecast.

Interpreting Prophet Forecasts for Decision-Making

"ds" — The date (and maybe the time) when the prediction is valid.

"yhat" — The most likely prediction for what "y" will be, as produced by the model.

"yhat_lower" — The lowest prediction for what "y" will be (which is less likely to occur than "yhat").
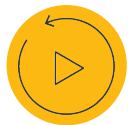
"yhat_upper" — The highest prediction for "y" (which is also less likely to occur than "yhat").

```python
# Display the underlying forecast dataframe (tail)
forecast[['ds', 'yhat', 'yhat_lower', 'yhat_upper']].tail()
```

	ds	yhat	yhat_lower	yhat_upper
44083	2020-11-13 20:00:00	22.278604	2.334294	40.122034
44084	2020-11-13 21:00:00	19.970203	1.919877	39.030890
44085	2020-11-13 22:00:00	17.375313	-1.068793	36.536929
44086	2020-11-13 23:00:00	15.124197	-3.128225	34.711497
44087	2020-11-14 00:00:00	13.473397	-4.806883	32.866727
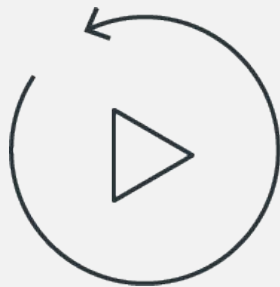
Let's **recap**

Recap: Let's recap what we just did in this activity

1 Our goal was to help our potential borrowers make better investment decisions regarding loans for purchasing solar panels.

2 We used Prophet to analyze electricity prices and break down price data as an hourly time series.

3 We separated the data into identifiable patterns that occur across days of the week, hours of the day, and months of the year.
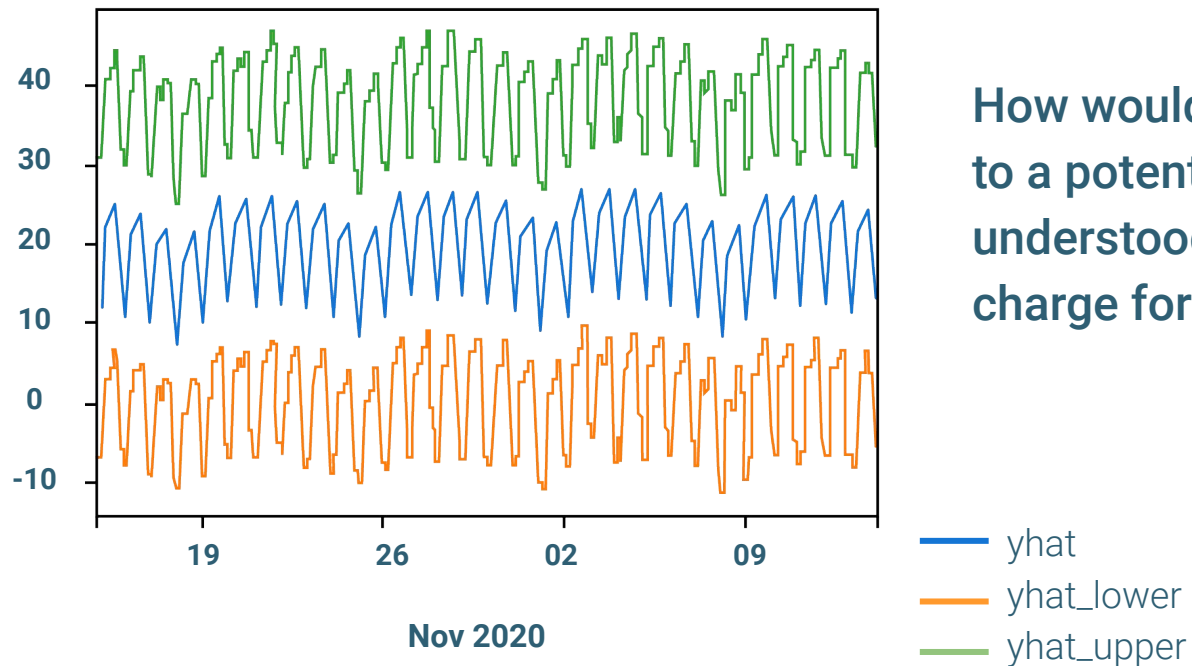
4 By breaking down a complicated series into these types of patterns, we can better predict future data.

Recap

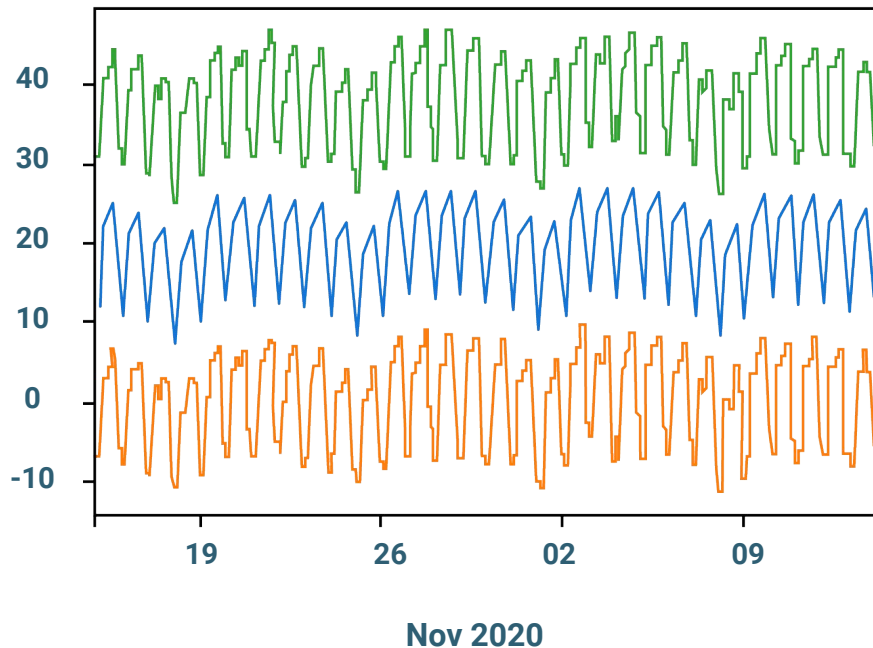Recall the plot of "yhat," "yhat_lower," and "yhat_upper" from earlier in this lesson.

How would you explain this plot to a potential client so that they understood how much they could charge for their electricity?

Recap: Answer

One answer is to note that the **orange line** (for "yhat_lower") represents the worst-case pricing scenario for their electricity.

The **green line** (for "yhat_upper") represents the highest price that they're likely to receive.

The most likely outcome is that they'll be able to sell their electricity on most days for the prices indicated by the **blue line** (for "yhat").

— yhat
— yhat_lower
— yhat_upper

Recap

Prophet helped us analyze our time series data by breaking down its many patterns and producing forecasts of future patterns.

We applied these patterns to predict electricity prices, but we can use the same code to solve other problems. Examples include:

Predicting a stock or commodity price over time

Predicting sales trends in a local real estate market

Forecasting and understanding the patterns in a company's revenue

Questions?

Activity:

Interpreting Forecasting Results

In this activity, you will delve into the time series forecasting results derived from Google Trends data.

Suggested time:

20 minutes

Time's up!
Let's review

Questions?

Break

15 mins

Activity:
Forecasting Bitcoin Prices by Using Prophet

This mini project provides an opportunity for you to gain practical experience with using Prophet to forecast Bitcoin prices.

Suggested time:
40 minutes

Time's up!
Let's review

Questions?

Activity:

Group: Analyze and Predict Data

This is a group activity. You will be sent into breakout rooms shortly.

In this activity, you'll use Prophet to analyze and predict S&P 500 prices, then you'll discuss your findings with the class.
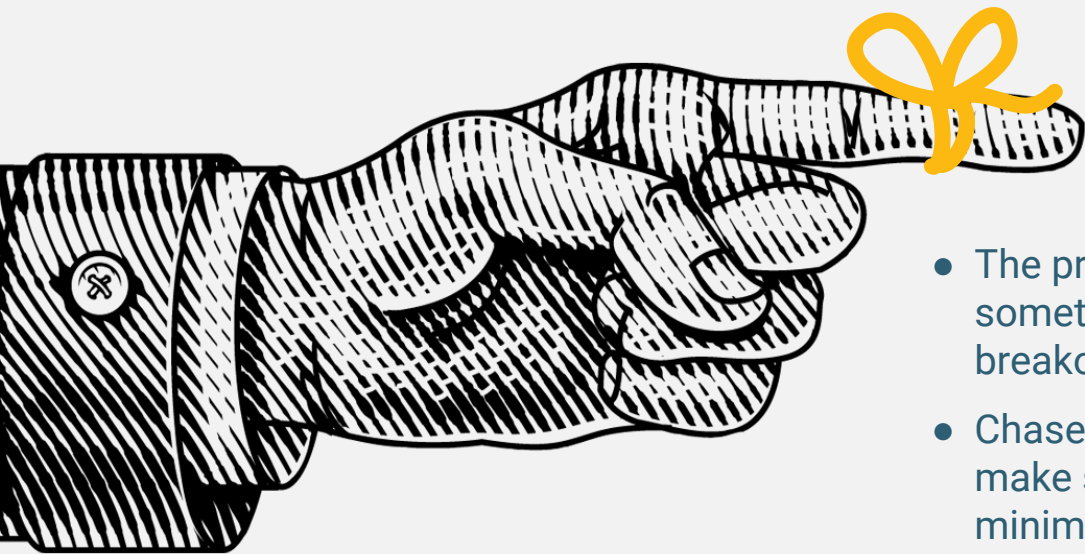
Suggested time:

20 minutes

This activity is intentionally open-ended. The provided solution is just one of many ways to achieve the goal.
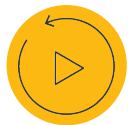
Remember:

- The primary focus of this challenge is to find something interesting to talk about when the breakout rooms close.

- Chase ideas and challenge yourself, but make sure to use Prophet to achieve the minimum requirements first.

- Have fun!

Time's up!
Let's review

Recap

After today's lesson, you are able to:

1 Use Prophet for time series forecasting.

2 Interpret the forecasting results for decision-making.

3 Apply advanced time series forecasting models by using Prophet.

The End