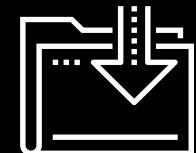


# Time Series Forecasting with Prophet

Fintech  
Lesson 11.3



# Class Objectives

---

By the end of this lesson, you will be able to:



Use Prophet for time series forecasting.



Interpret the forecasting results for decision-making.



Apply advanced times 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

# Sample Versus Out-of-Sample Predictions

---

We can use the `future` DataFrame to make predictions for both 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:

01

Read the Forecast results.

02

Plot the upper and lower bounds of the forecast.

03

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”).

```
# 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  |



# Recap

---

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



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



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



We separated the data into identifiable patterns that occur across days of the week, hours of the day, and months of the year.

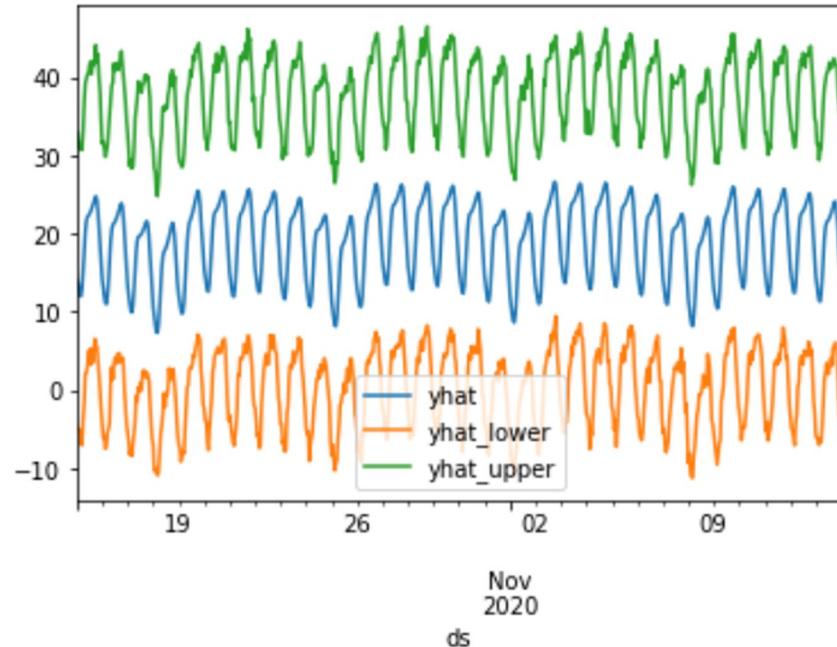


By breaking down a complicated series into these types of patterns, we can better predict future data.

# Recap

---

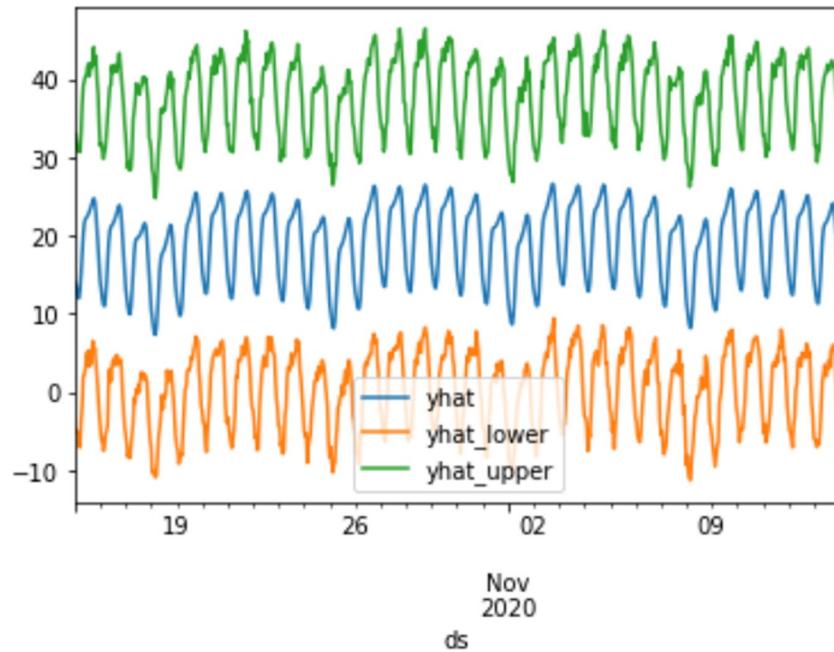
Recall the plot of “yhat”, “yhat\_lower”, and “yhat\_upper” from earlier in this lesson.



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” at the bottom of the plot) represents the worst-case pricing scenario for their electricity.



The **green line** (for “yhat\_upper” at the top) 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** in the middle (for “yhat”).

# 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 the problem of predicting electricity prices, but we can use the same code to solve other problems. Examples include:

|        |         |   |         |          |
|--------|---------|---|---------|----------|
| 12. 84 | +3. 56% | ▲ | 120. 34 | 300, 000 |
| 23. 90 | +12. 3% | ▲ | 543. 23 | 120, 000 |
| 15. 89 | +5. 34% | ▲ | 254. 23 | 320, 000 |
| 15. 34 | -7. 89% | ▼ | 321. 56 | 430, 000 |
| 7. 34  | +5. 97% | ▲ | 100. 08 | 120, 000 |
| 7. 89  | +2. 13% | ▲ | 564. 23 | 900, 000 |
| 7. 45  | +6. 43% | ▲ | 765. 90 | 600, 000 |
| 6. 7   | -11. 6% | ▼ | 120. 34 | 300, 000 |
| 6. 4   | +23. 1% | ▲ | 893. 23 | 120, 000 |
| 5. 9   | +5. 56% | ▲ | 128. 98 | 320, 000 |
| 8. 7   | -3. 67% | ▼ | 432. 12 | 750, 000 |
| 7. 7   | +11. 3% | ▲ | 765. 23 | 150, 000 |
| 7. 7   | +2. 54% | ▲ | 432. 24 | 120, 000 |

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 interpret the time series forecasting results of the Google Trends data.

Suggested Time:

---

20 Minutes



Time's Up! Let's Review.

# Questions?





Countdown timer

15:00

(with alarm)

Break





# Activity: Forecasting Bitcoin Prices with Prophet

In this activity, you will gain practical experience with using Prophet to forecast Bitcoin prices.

Suggested Time:

---

40 minutes



Time's Up! Let's Review.

# Questions?





# The Career Team

A photograph of a young woman with dark skin and curly hair tied up in a bun, smiling at the camera. She is wearing a white t-shirt under a striped cardigan with colors like pink, yellow, and black. She is sitting at a desk in what appears to be a library or study area, with bookshelves filled with books in the background. A yellow speech bubble is overlaid on the left side of the image.

It's time to update  
your resumes to  
showcase your projects  
and all the new skills  
you've acquired!



# Why is it important to showcase your projects?

All employers want a portfolio that demonstrates your capability in the fintech field.





Do you know who to submit your  
resume to for review?

A photograph of two professionals, a man and a woman, sitting at a desk in an office with large windows overlooking a city skyline. They are both holding and looking at documents. The woman is on the left, wearing a tan blazer and blue jeans, and the man is on the right, wearing a striped shirt and khaki pants. A yellow circular graphic on the right side of the image contains the text "Your Career Material Advisor".

Your  
Career  
Material  
Advisor



Where can you submit this to a  
Career Material Advisor?



# Sign in to Bootcamp Spot

EMAIL ADDRESS \*

student@example.com



PASSWORD \*

Enter your password



SIGN IN

*First time logging in? Check your email for a unique  
username/password and come right back! Remember to  
check your spam folder too!*

[Forget your password?](#)

[Can't Login? Contact Support](#) (*Link opens in a new window*)



Who has completed  
their resume and  
already submitted it to a  
Career Material Advisor  
on [Bootcamp Spot](#)?

# Identify Your Resume Type

Not everybody in the class has the same objectives or background. There are a variety of experience levels that can fit into the following categories:

| Level  | Background   | Resume template   |
|--|--|---|
| <b>Entry level</b><br>(no experience)        | You are looking to break into the fintech industry with fewer than three years of work experience. Your background has nothing to do with fintech.       | Use the <b>entry-level/mid-level (no experience)</b> template to either make a new resume or incorporate any missing components into your existing resume.          |
| <b>Mid-level</b><br>(nonrelevant experience) | You have worked in a different industry, but your experience has nothing to do with the fintech industry.  | Use the <b>entry-level/mid-level (nonrelevant experience)</b> template to either make a new resume or incorporate any missing components into your existing resume. |
| <b>Mid-level</b><br>(relevant experience)    | You have worked in the fintech industry and took this course to gain specific skills that can either advance your career or fill gaps in your knowledge. | Use the <b>mid-level (experience)</b> template to either add to your existing resume or start from scratch.   |

# Identify Your Resume Type (Continued)

---

| Level   | Background  | Template  |
|---|---|---|
| <b>Senior level</b><br>(nonrelevant experience) | You have 10 years or more experience in a different industry but no relevant fintech (in-field) experience. | Use the <b>senior-level (nonrelevant experience)</b> template to either update your existing resume or create a new resume. |
| <b>Senior level</b><br>(relevant experience)    | You will need to incorporate skills that you learned in the classroom to your resume.                       | Use the <b>senior-level (experience)</b> template to either update your existing resume or create a new resume.             |

Create a resume that fits your skill and/or experience level.

---

This will give you the greatest chance of gaining employment or the promotion that you seek.





# Activity: Build Your Resume

For the next part of class, you will work on your resume.

[Resume Templates](#)

Suggested Time:

---

25 minutes

# Build Your Resume

---

Select the [template](#) that best fits your needs.

If you already have a resume, adapt it to include all the sections from the appropriate template.



Every student should submit a completed resume to a Career Material Advisor in Bootcamp Spot by the end of class.



Students who are unable to complete their resume on time should submit it to Bootcamp Spot by the end of the week.



This will allow you to get feedback on your work. Career Material Advisors should respond with feedback within 96 hours.



Bonus

---

## Technical Interviewing Prep

# Questions?



*The  
End*