HELPFUL RESOURCES

Prophet Documentation

- Official: https://facebook.github.io/prophet/
- Quick Start: https://facebook.github.io/prophet/docs/quick_start.html

Task 1: Simple Heart Rate Forecasting (15 points)

Objective: Build your first Prophet model to forecast heart rate data.

Instructions:

python
"""
TASK 1: Heart Rate Forecasting

Given: 60 days of daily average heart rate data
Goal: Forecast next 14 days

Steps:
1. Create sample data (or use provided dataset)
2. Format data for Prophet (ds, y columns)
3. Fit Prophet model
4. Make 14-day forecast
5. Visualize results
6. Calculate MAE (Mean Absolute Error)
"""

What to Submit:

- Code with comments explaining each step
- Plot showing: actual data + forecast + confidence intervals
- Answer: What is the forecasted heart rate for Day 67?
- Answer: What does the confidence interval tell you?

Grading Rubric:

- Data preparation (3 points)
- Model fitting (3 points)
- Forecasting (3 points)
- Visualization (3 points)
- Analysis/interpretation (3 points)

Task 2: Sleep Pattern Analysis (15 points)

Objective: Analyze weekly sleep patterns using Prophet.

Instructions:

python
```
"""
TASK 2: Sleep Pattern Forecasting

Given: 90 days of sleep duration data (hours per night)
Goal: Identify patterns and forecast next 7 days

Steps:
1. Load/create sleep data
2. Add weekly seasonality to Prophet model
3. Fit model and forecast
4. Plot components (trend + weekly pattern)
5. Identify which days have best/worst sleep
"""
```

What to Submit:

- Code with Prophet model including weekly seasonality
- Component plot showing trend and weekly seasonality
- Answer: On which day of the week do you sleep most? Least?
- Answer: Is sleep duration increasing or decreasing over time?
- 7-day forecast plot

Grading Rubric:

- Seasonality configuration (4 points)
- Component analysis (4 points)
- Pattern identification (4 points)
- Visualization quality (3 points)

Task 3: Step Count with Holidays (10 points)

Objective: Incorporate special events (holidays/vacations) into forecast.

Instructions:

python
"""
TASK 3: Steps with Holiday Effects

Given: 120 days of daily step count
Special events:
  - Vacation: Days 30-37
  - Sick: Days 60-62
  - Marathon: Day 90

Goal: Model impact of these events

Steps:
1. Create holidays DataFrame
2. Build Prophet model with holidays
3. Compare: Model with vs without holidays
4. Forecast next 30 days
"""

What to Submit:

- Code showing how to add holidays to Prophet
- Holidays DataFrame structure
- Two plots: (1) without holidays, (2) with holidays
- Answer: How much do holidays impact step count?
- Answer: Which event had the biggest effect?

Grading Rubric:

- Holiday implementation (3 points)
- Comparison analysis (3 points)
- Interpretation (2 points)
- Documentation (2 points)