Leveraging Business and Engineering Metrics with ML-Powered Scorecards

A Modern Approach to Product Health Assessment

Marianna Budnikova, November 7, 2024

Hi, I am Marianna!

- 10+ years in tech
- Lead Android Developer Experience Engineer at Cash App (part of Block)
- Ex-Dropbox, ex-Microsoft
- B.S and M.S in Computer Science (with emphasis on AI/ML) from Boise State University

- **Note**: I do NOT represent my current or previous employers on this talk.

If you want to follow along…

https://shorturl.at/lkwlF

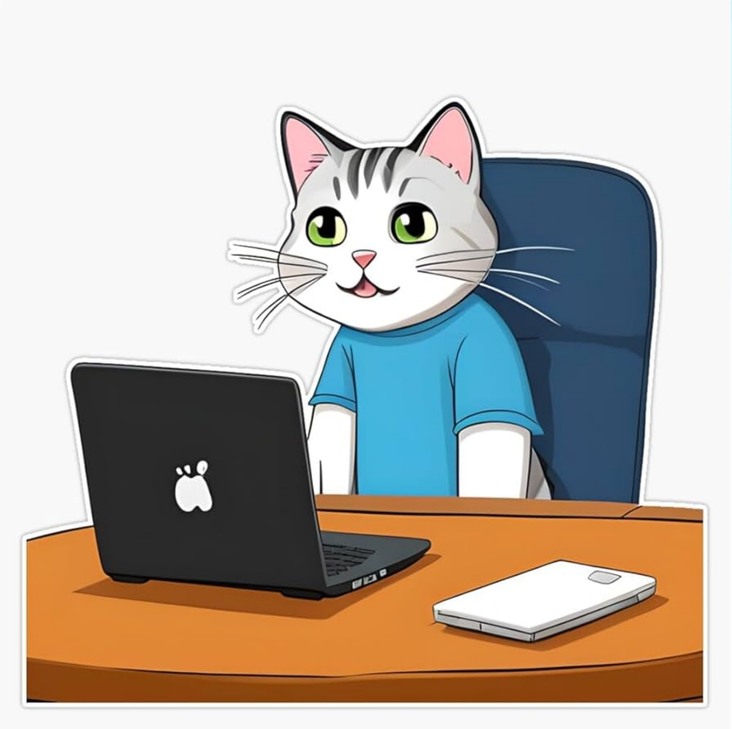
TL;DR;?

Let’s start with a story…

- **API** for developers
- **Website** for general users
- **Mobile app** (iOS and Android)

RandomCats, Inc

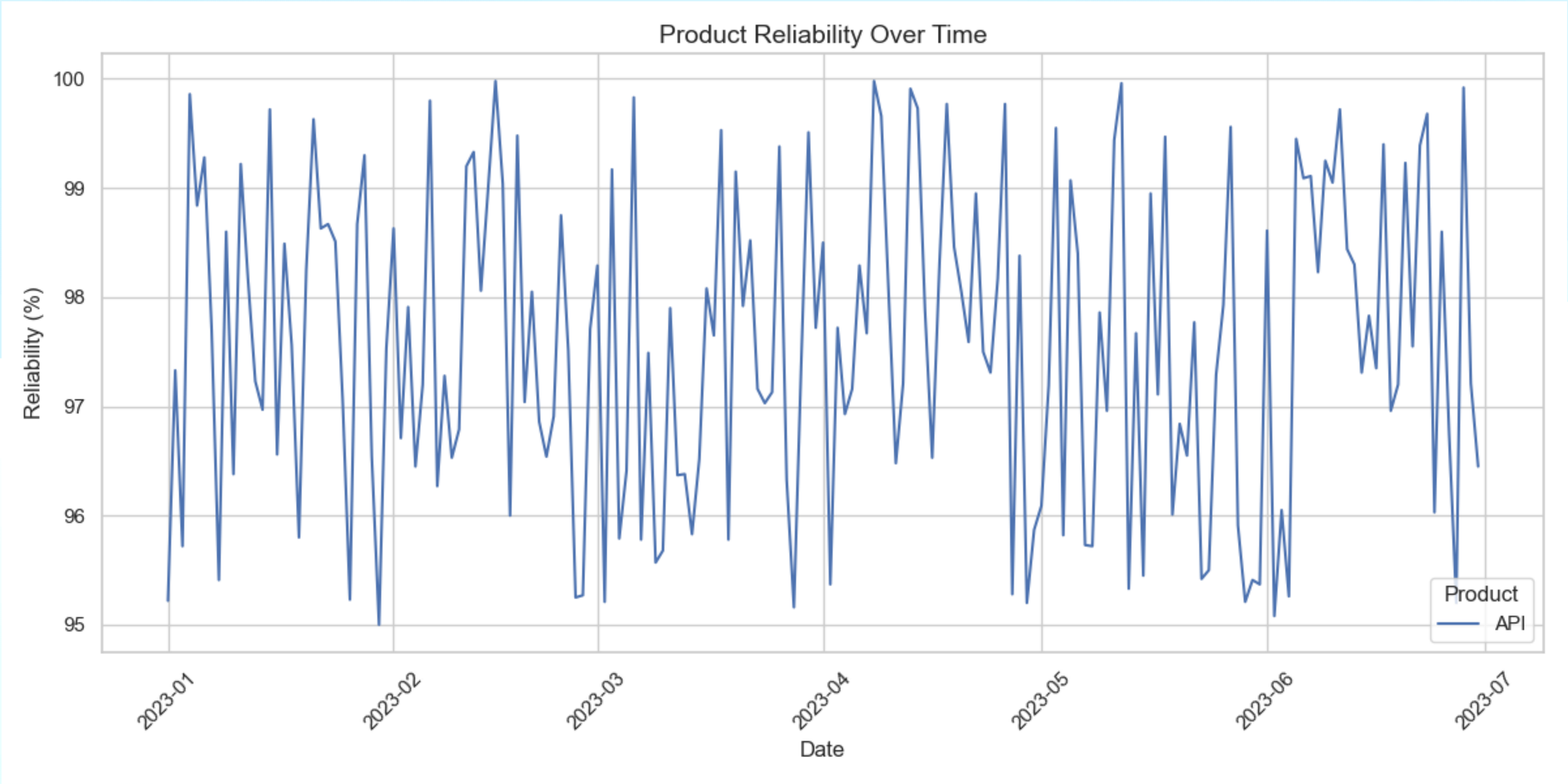
RandomCats, Inc Actors



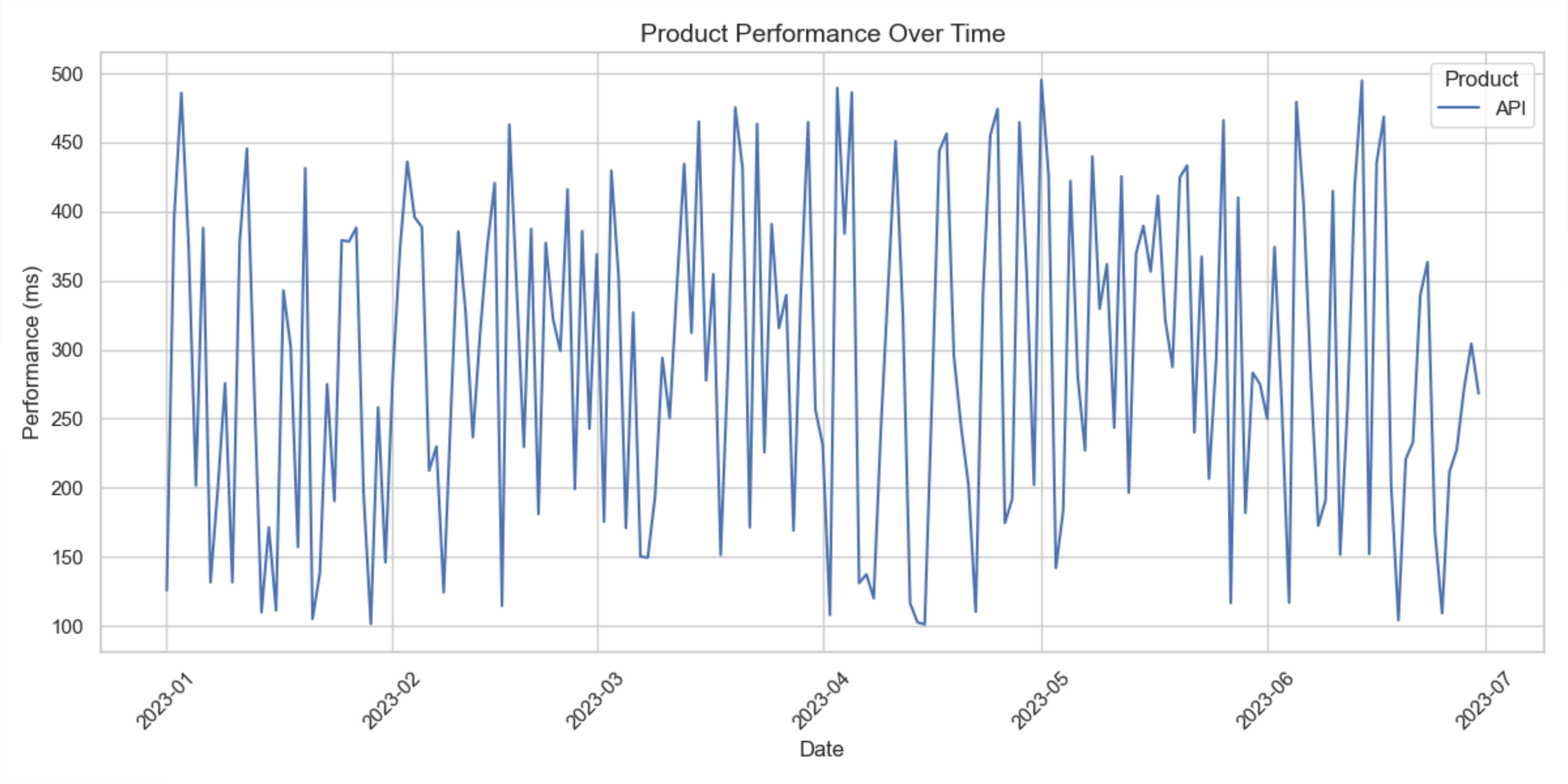
Engineering Metrics

- **Reliability (%)**: Uptime for each platform.
- **Performance (ms)**: Response time for the API, website, and app.

What do the Reliability metrics look like?

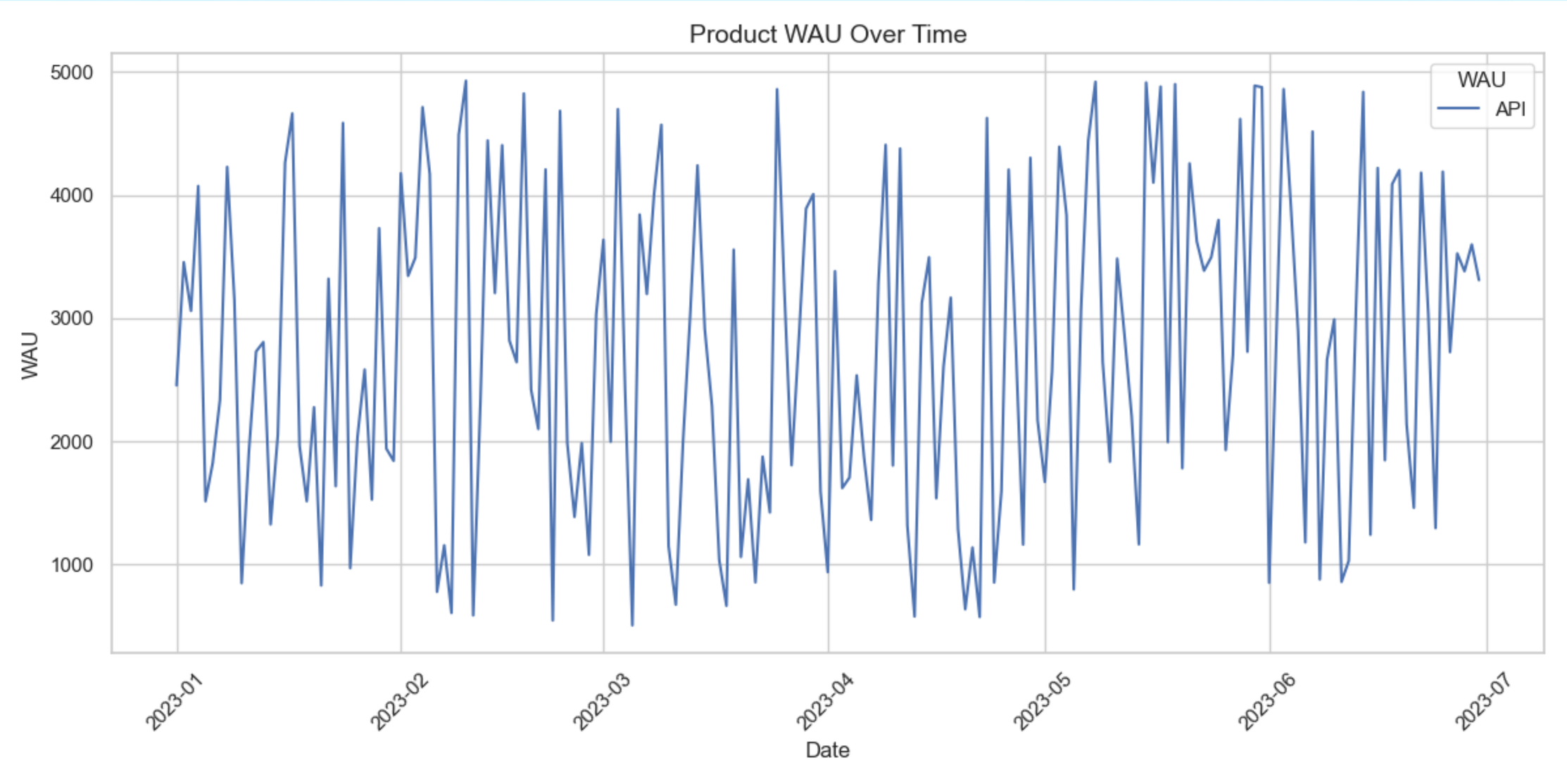


What do the Performance metrics look like?

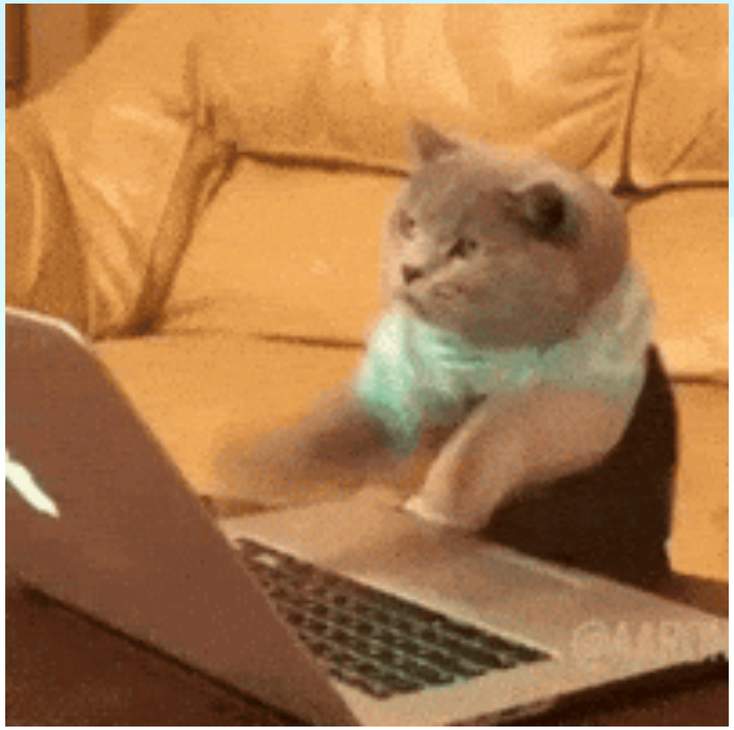


Business Metrics

What does WAU look like?



Let’s look at the code!

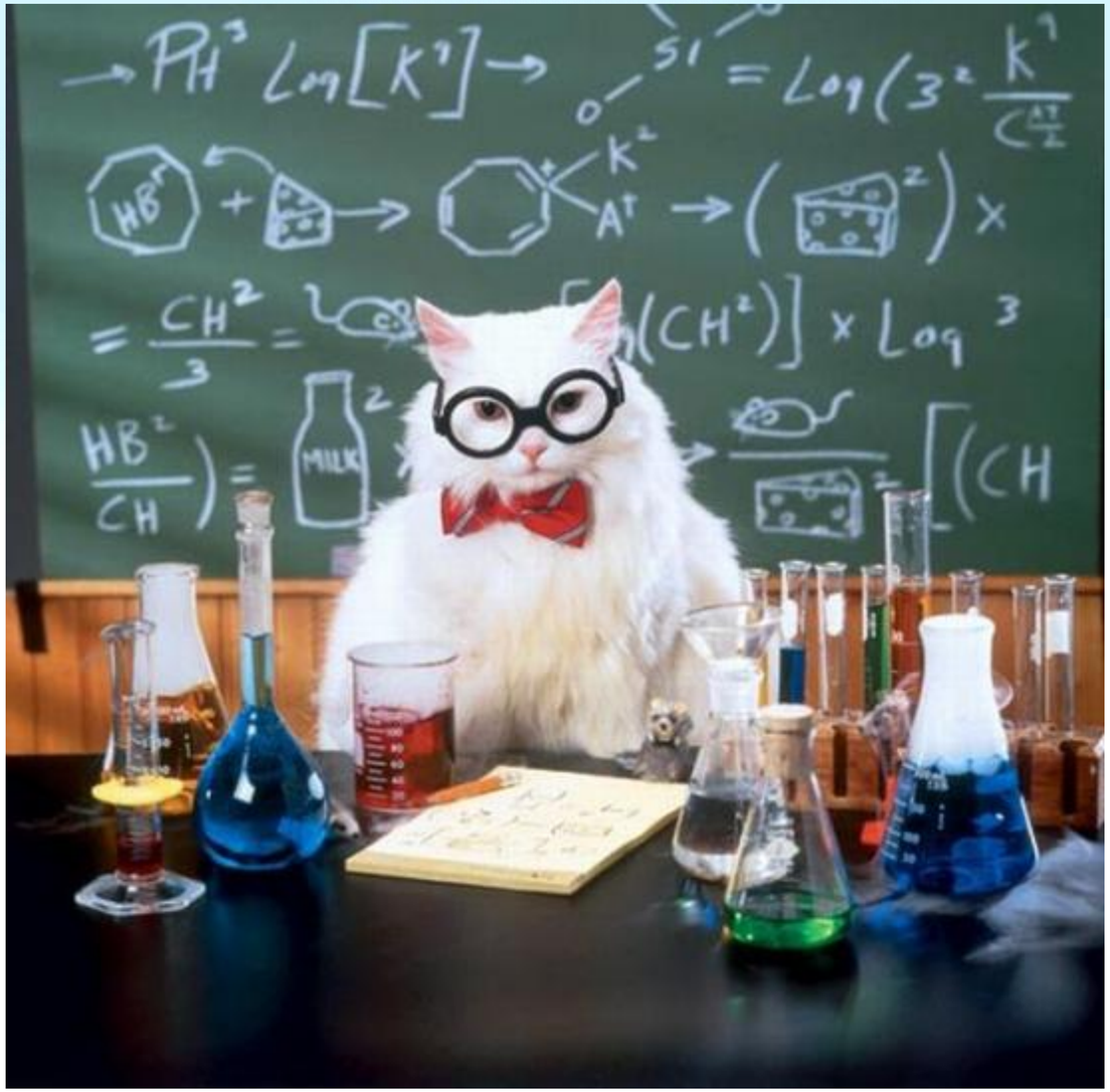


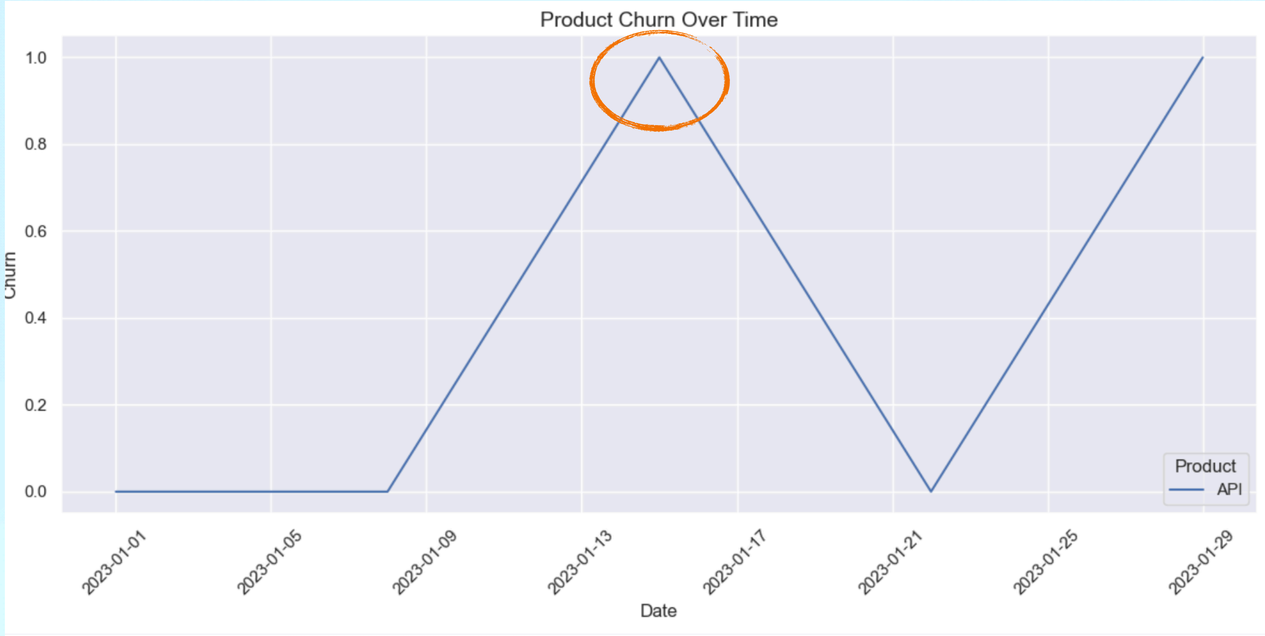
Attention! MAU SEV!!!

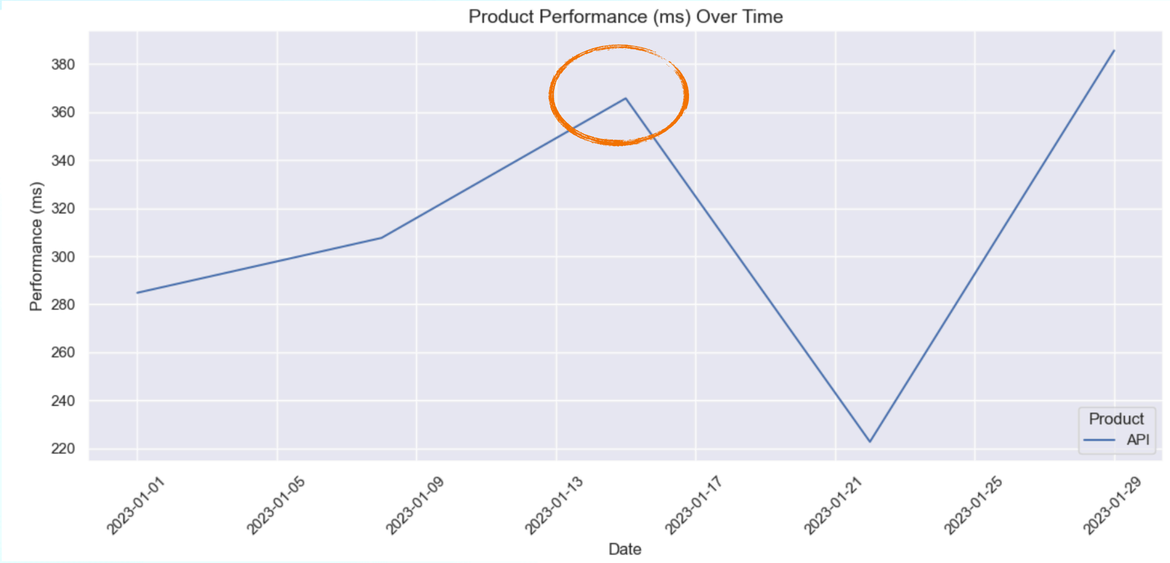
Correlation != Causation

Testing for correlation

- Visualization
- Statistical tests




Product Churn Over Time
Churn
1.0
0.8
0.6
0.4
0.2
0.0
2023-01-01
2023-01-05
2023-01-09
2023-01-13
2023-01-17
2023-01-21
2023-01-25
2023-01-29
Date
Product
API


Product Performance (ms) Over Time
Performance (ms)
380
360
340
320
300
280
260
240
220
2023-01-01
2023-01-05
2023-01-09
2023-01-13
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Date
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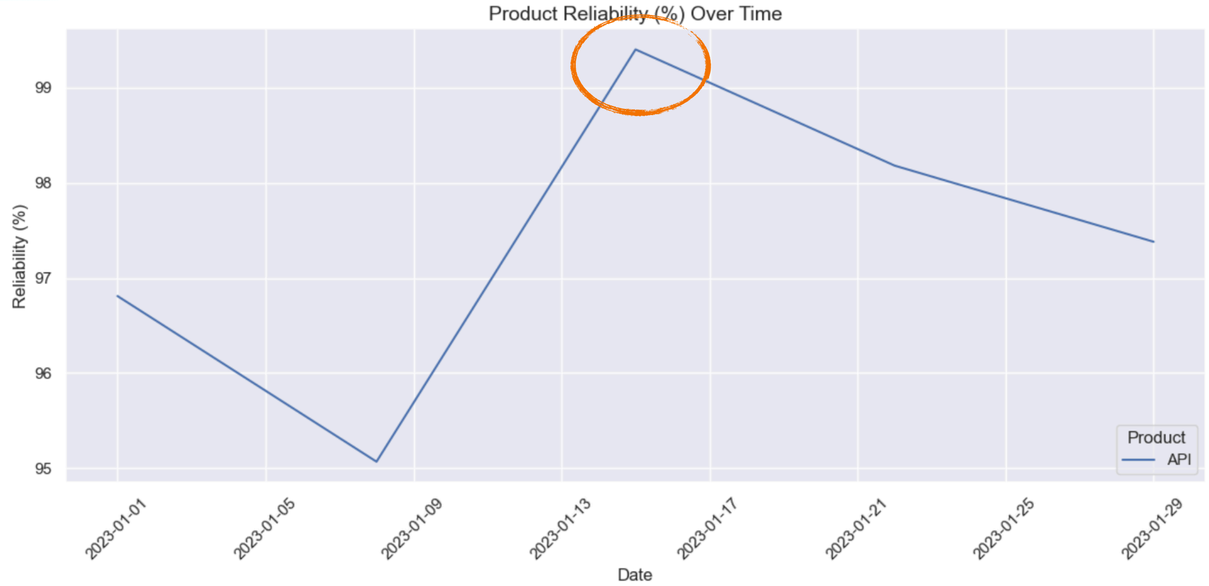
Product Reliability (%) Over Time
Reliability (%)
99
98
97
96
95
2023-01-01
2023-01-05
2023-01-09
2023-01-13
2023-01-17
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2023-01-25
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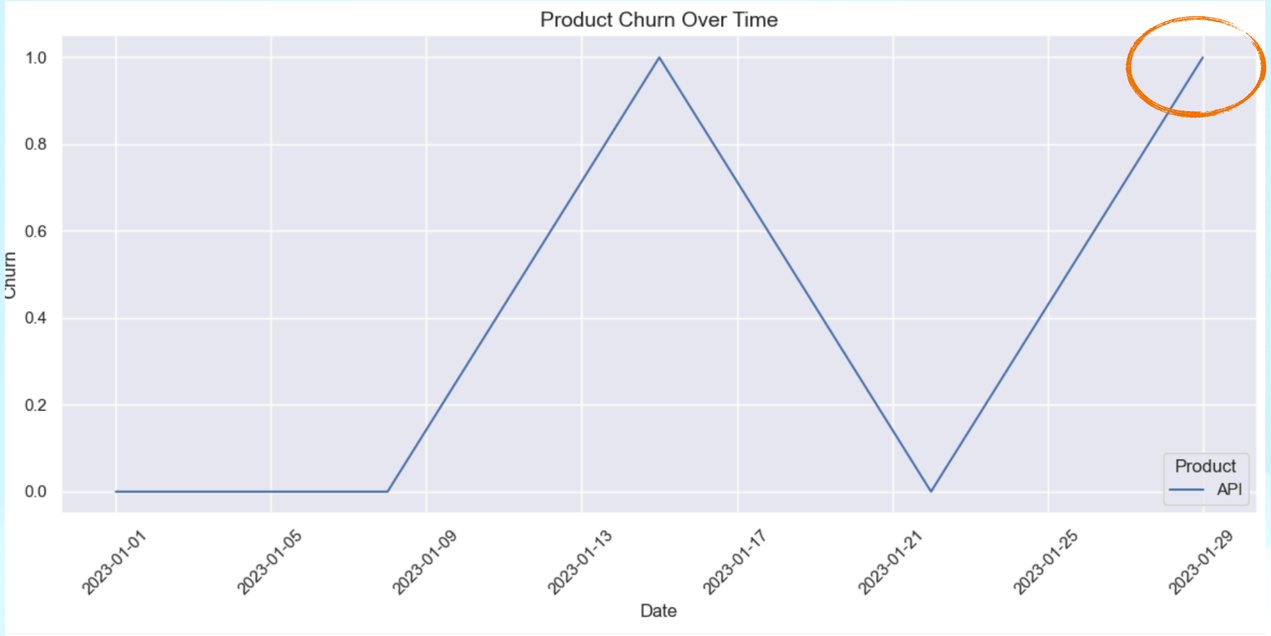
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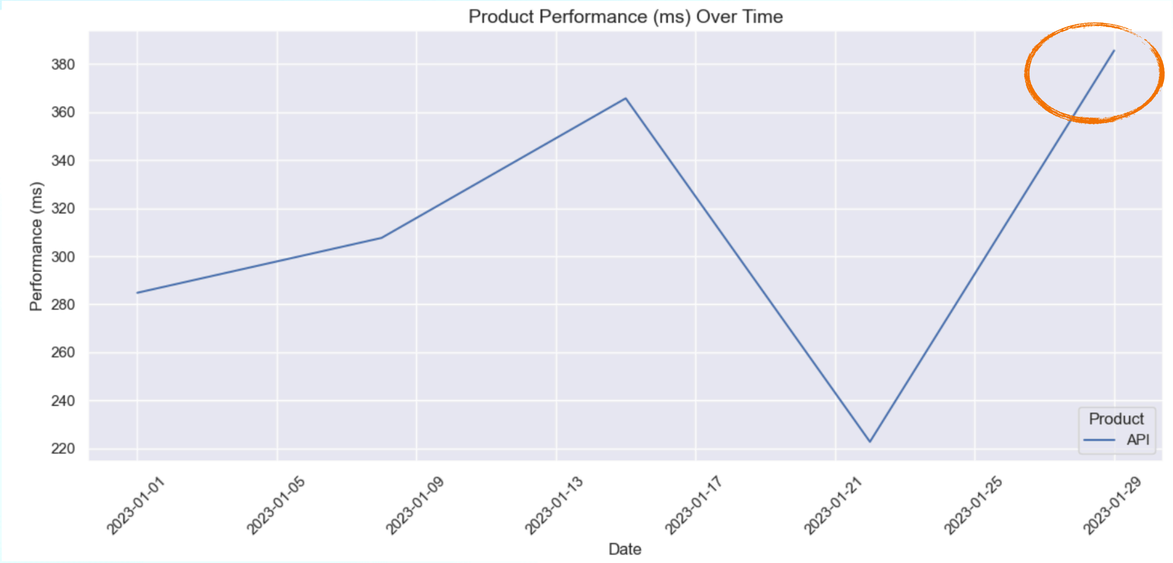
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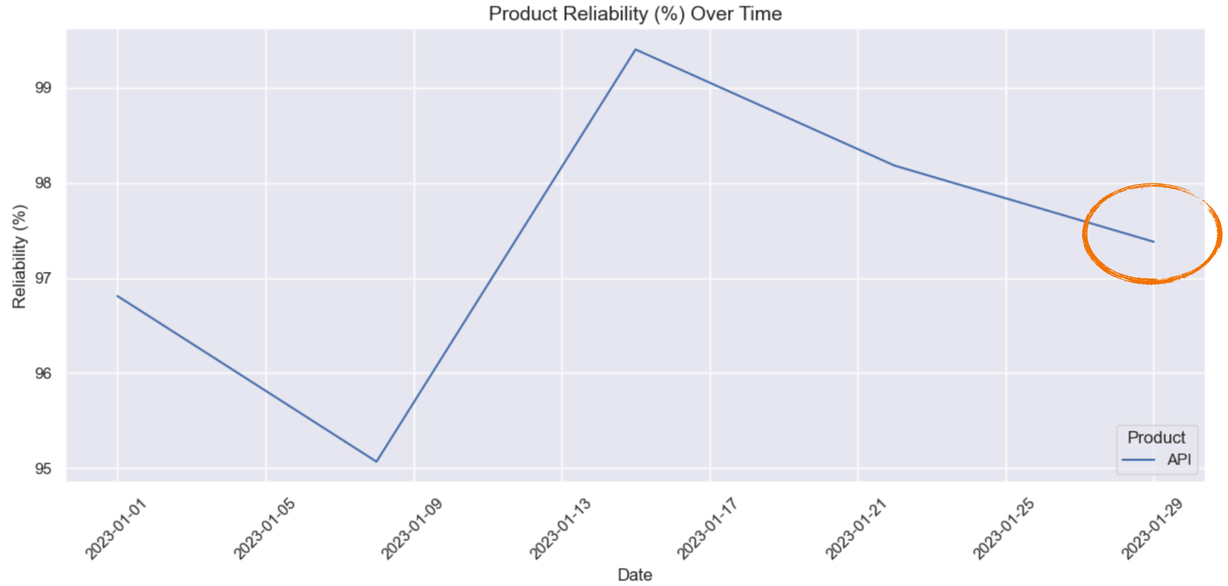
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Reliability (%)
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2023-01-01
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2023-01-17
2023-01-21
2023-01-25
2023-01-29
Date
Product
API

Testing with Pearson Correlation

$$r = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum (x_i - \bar{x})^2 \sum (y_i - \bar{y})^2}}$$

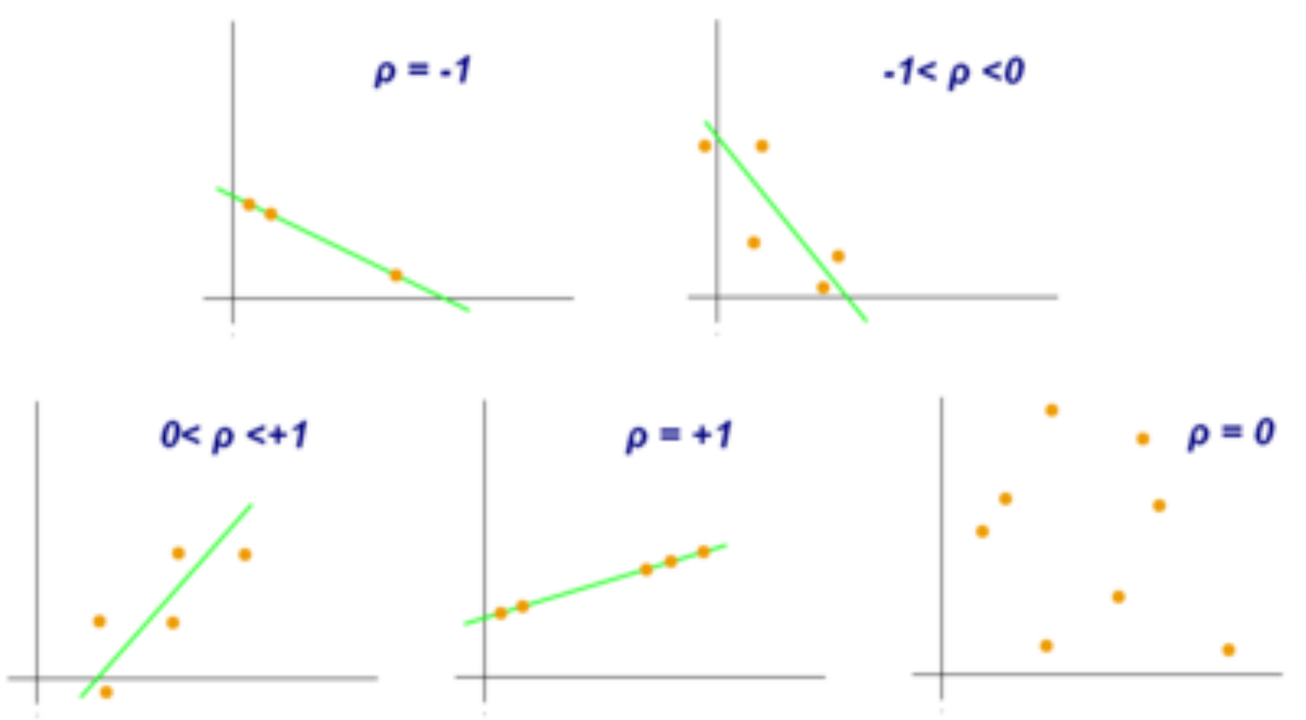
r = correlation coefficient

x_i = values of the x-variable in a sample

$\bar{x}$ = mean of the values of the x-variable

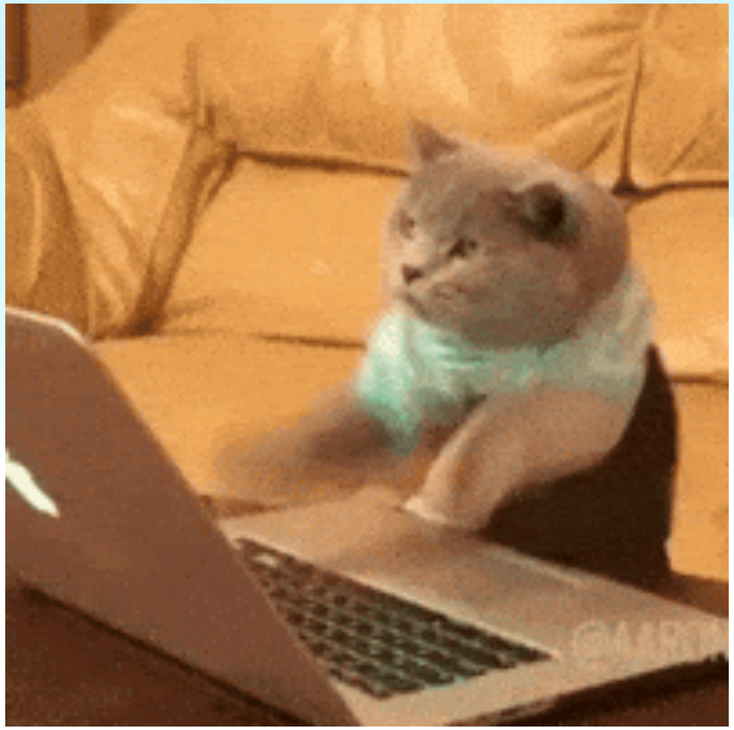
y_i = values of the y-variable in a sample

$\bar{y}$ = mean of the values of the y-variable



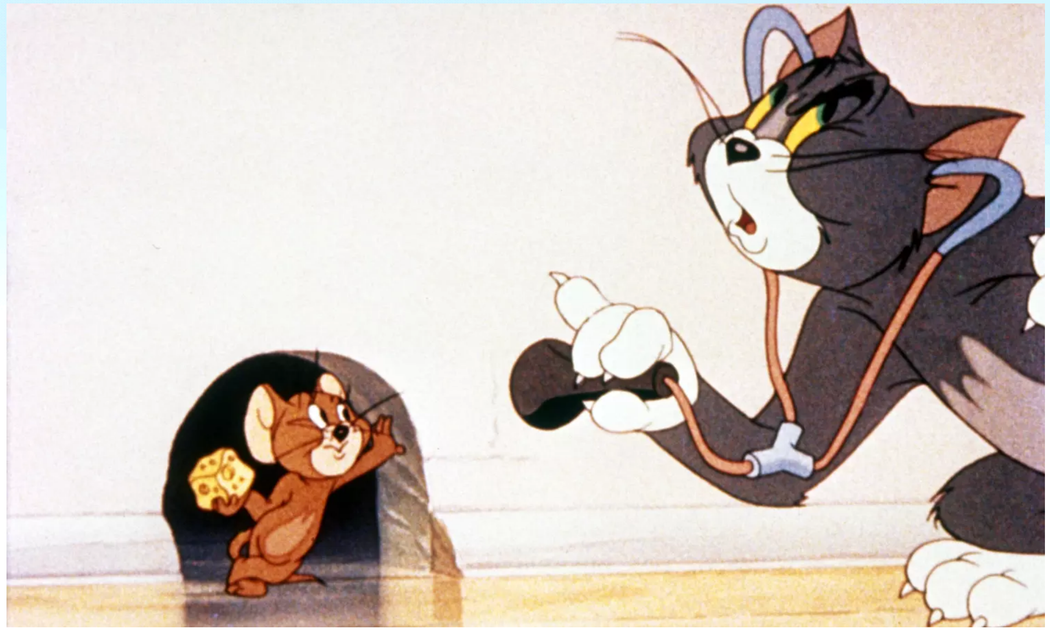
https://en.wikipedia.org/wiki/Pearson_correlation_coefficient

Let’s look at the code!



Build a model for churn prediction

Classic ML rocks!



What models exist for prediction?

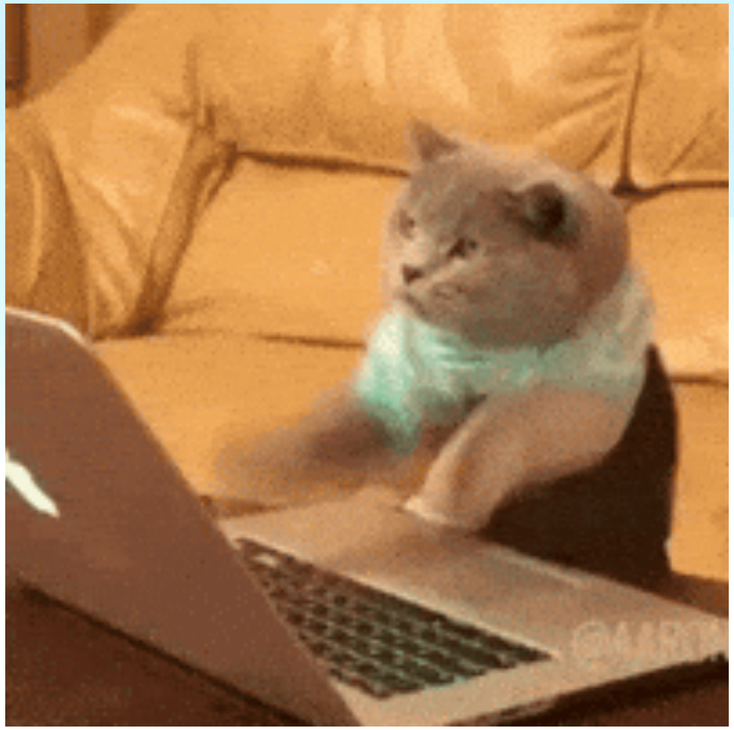
<according to ChatGPT>

- Logistic Regression
- Random Forest
- Gradient Boosting
- Deep Learning

Churned or not churned?

- Input:
  - Reliability (%) aka uptime
  - Performance (ms) aka response time
- Output:
  - Churned or not churned?

Let’s look at the code!



How do we combine all these?

Business Metrics + Engineering Metrics + ML = Scorecards!

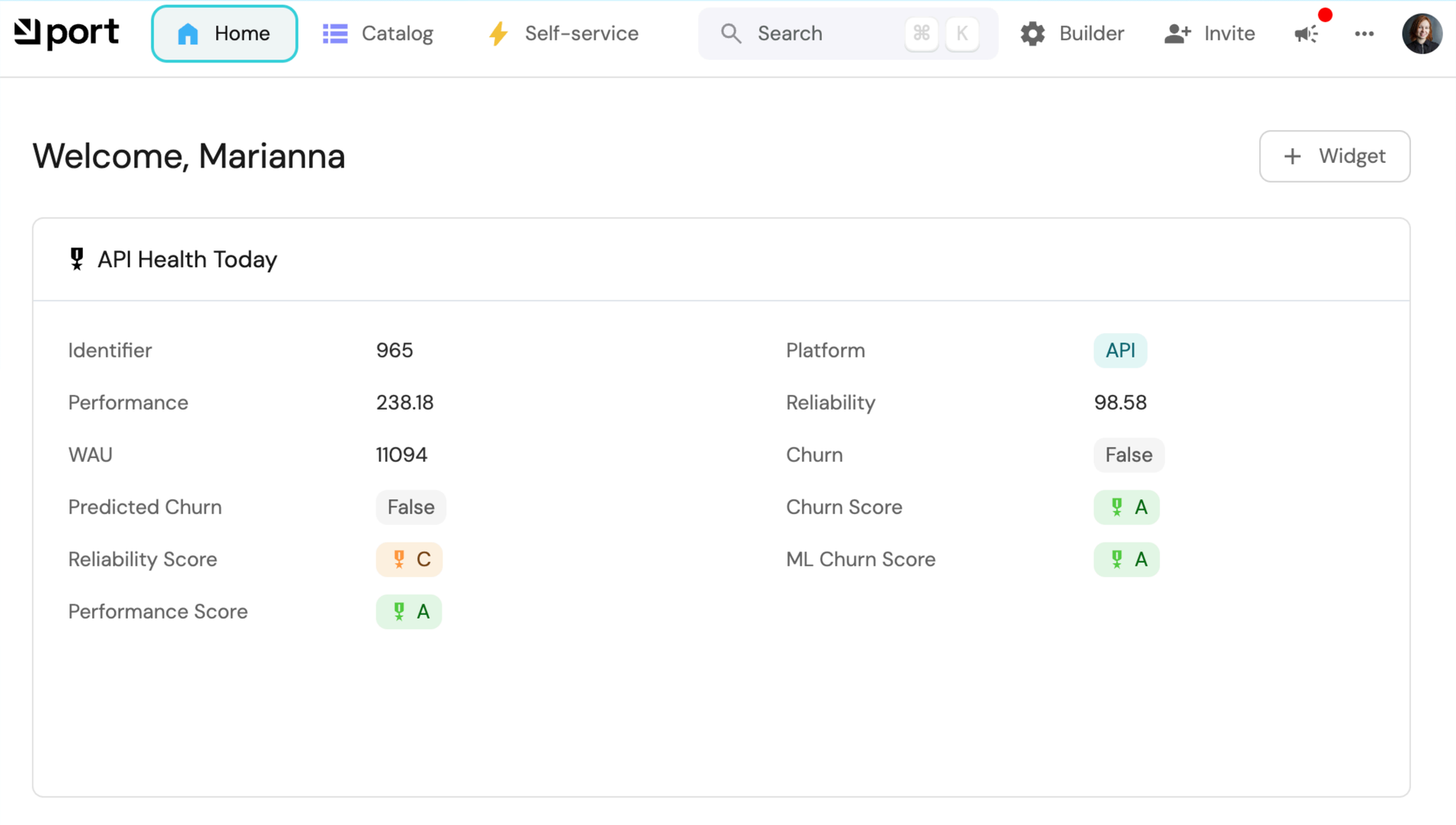
How do we grade each metric?

Grade	Performance (ms)	Reliability (%)	Churn
A	< 300ms	>=99.9%	0
B	300-400ms	99.0-99.9%	N/A
C	400-500ms	98.0-99.0%	N/A
F	>500ms	<98%	1

Where do you put your scorecard?

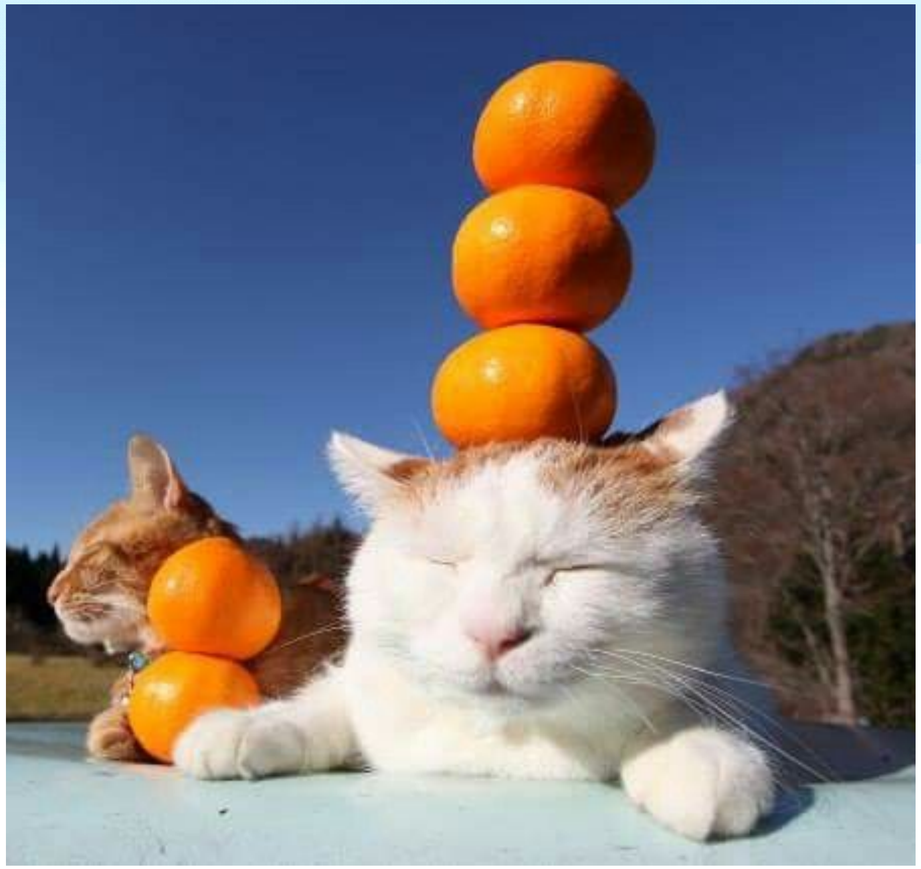
https://shorturl.at/p1Vuy

Let’s demo a Port Scorecard with our data!



What did we learn today?

- Business and engineering metrics should be examined together
- How to correlate metrics
- How to build a simple churn prediction model
- How to create scorecard



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