Stay Tuned with your Model

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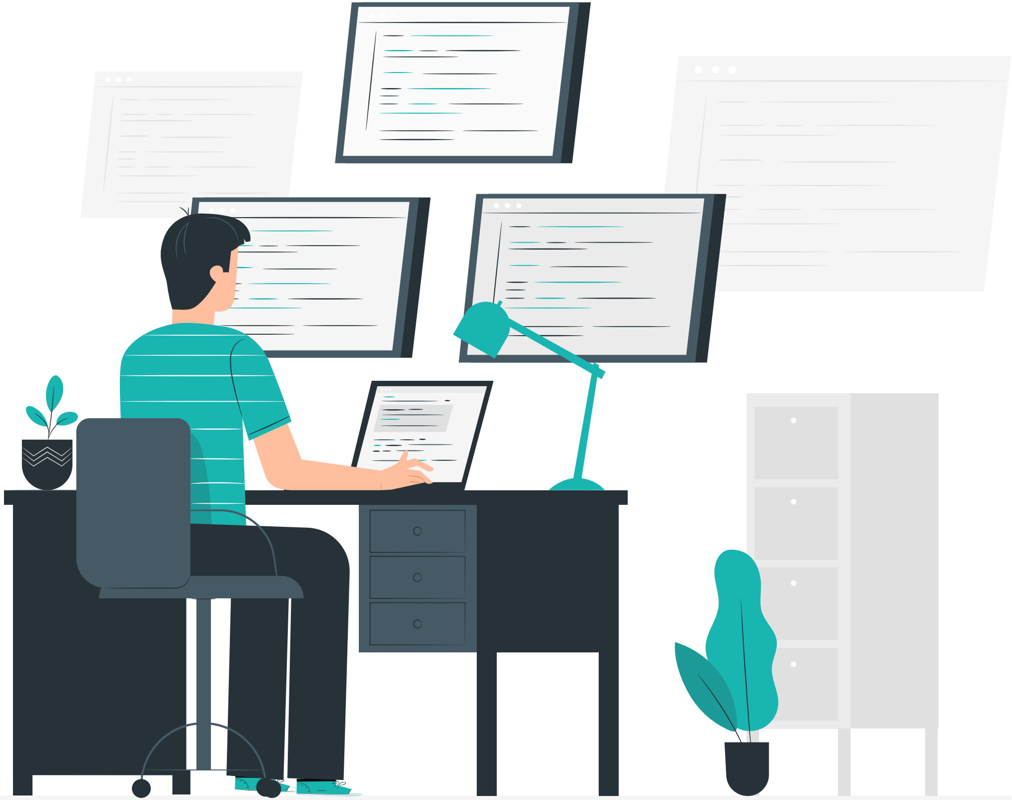

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Motivation

What happens to a Model after deployment?
How does Model performance monitoring help?

Motivation

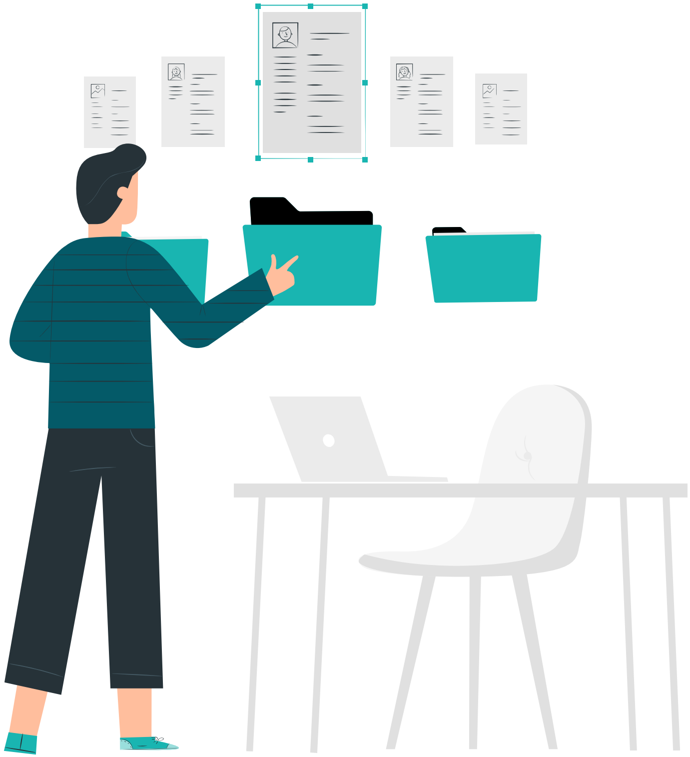
Fact

Models start to degrade once in production

Goal

- How to detect
- Which features to look for
- What strategies to take

Concept Drift
Description & Types



Types of Drift

0

Sudden Drift

An abrupt change where one concept replaces another.

1

Gradual Drift

As time passes the probability of sampling from one concept increases while another decreases

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Incremental Drift

A type of gradual drift. A stepwise transition from one concept to another.

04

Recurring Concepts

Previously active concepts reappear after some time

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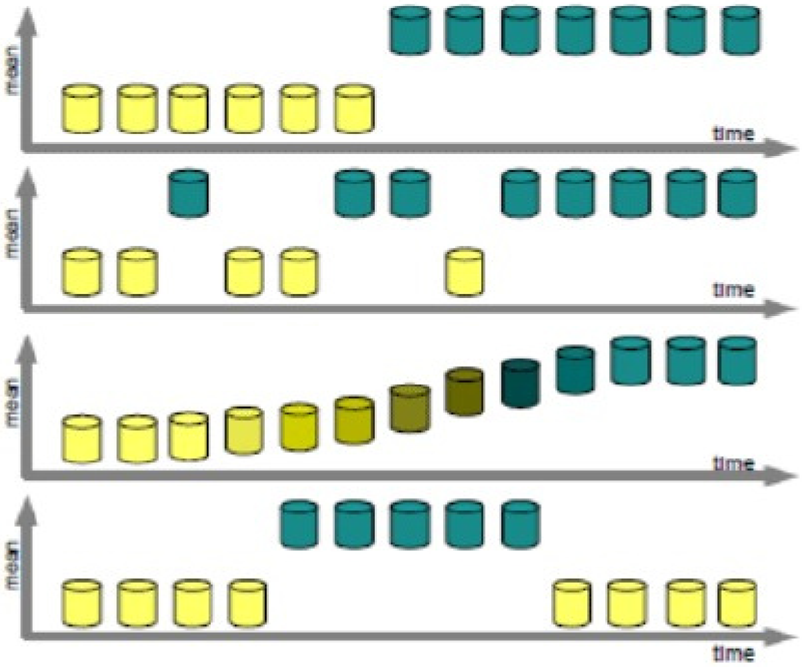


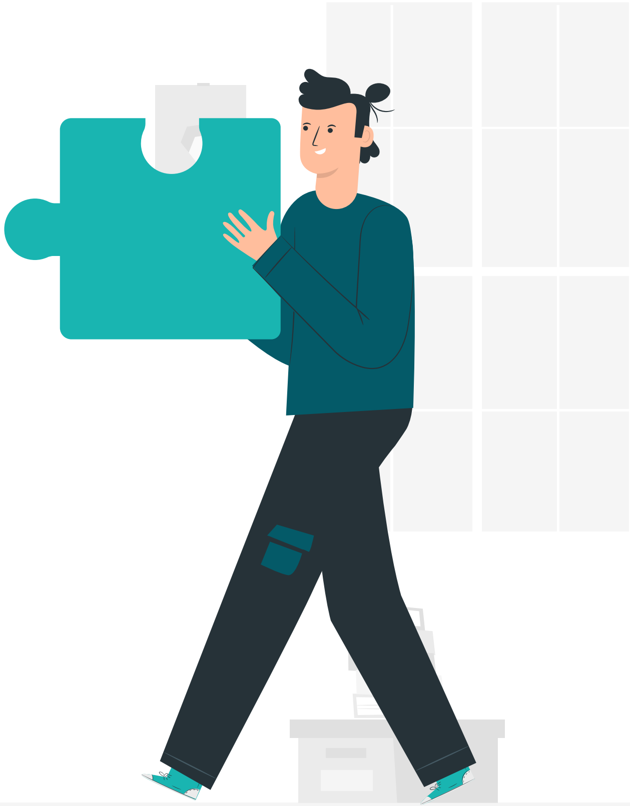
Metrics to capture Drift

PSI

Population Stability Index

Somers' D

Measures predictive ability



Population Stability Index (PSI)

Population stability index (PSI) is a metric to measure how much a variable has shifted in distribution between two samples or over time. It is widely used for monitoring changes in the characteristics of a population and for diagnosing possible problems in model performance.

Formula:

$$PSI = \sum \left((\%Actual - \%Expected) \times \ln \frac{\%Actual}{\%Expected} \right)$$

Rule of thumb:

PSI Value	Inference	Action
Less than 0.1	Insignificant	No action required
0.1 -0.25	change Some	Check other metrics (Somers' D)
Greater than 0.25	Minor change Major shift in population	Need to delve deeper

Data and Demonstration

Brief intro to data set and Visualizations

Demonstration

In order to demonstrate that PSI captures the change in Data distribution,
We manually manipulated a feature each day

Day 1 -Increased % of Cars with Number of Doors = 2

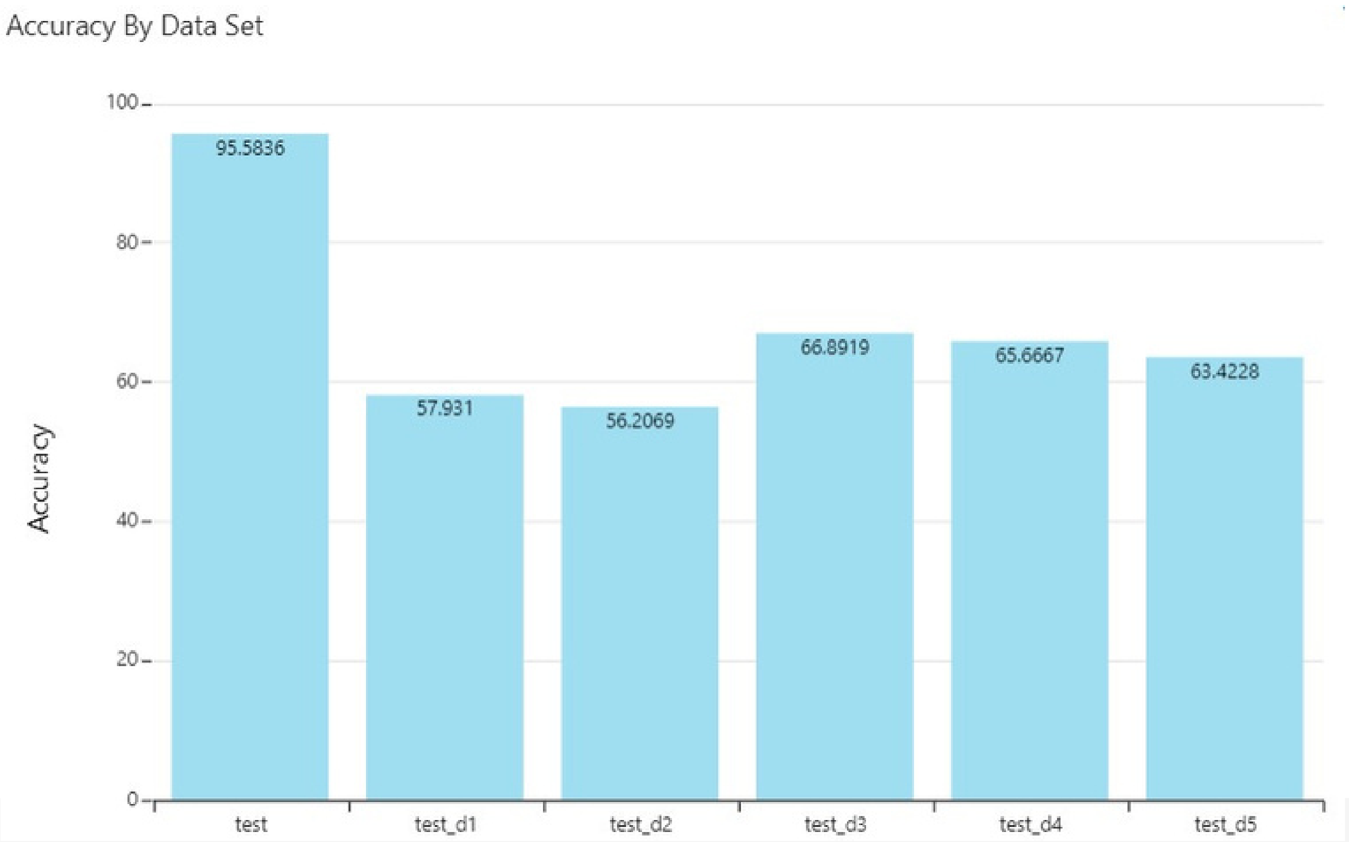
Day 2 -Decreased % of Cars with Low Safety

Day 3 -Increased % of Cars with Very high buying price

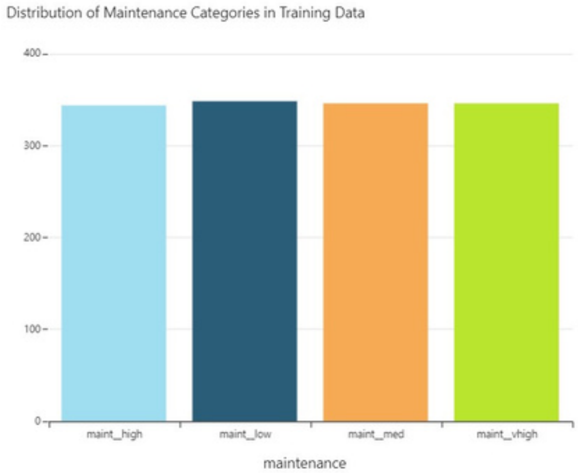
Day 4 -Decreased % of Cars with Number of People = 4

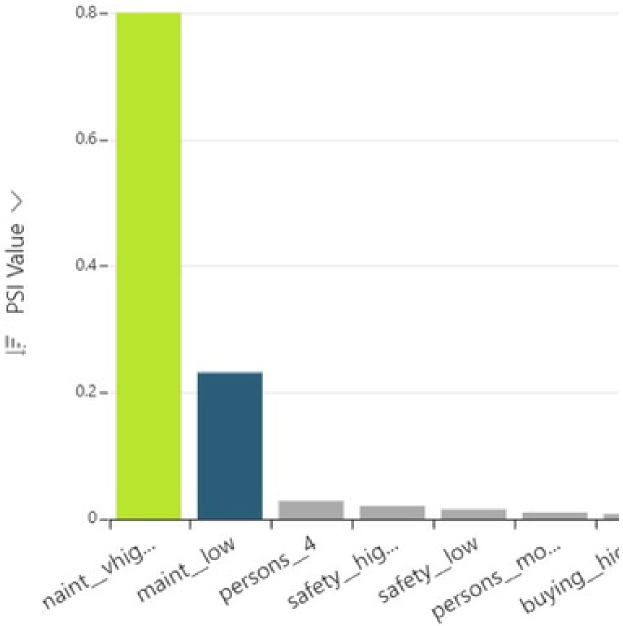
Day 5 -Increased % of Cars with Very high Maintenance

Accuracy decreased with change in data distribution



Quicksight dashboard to identify changed columns

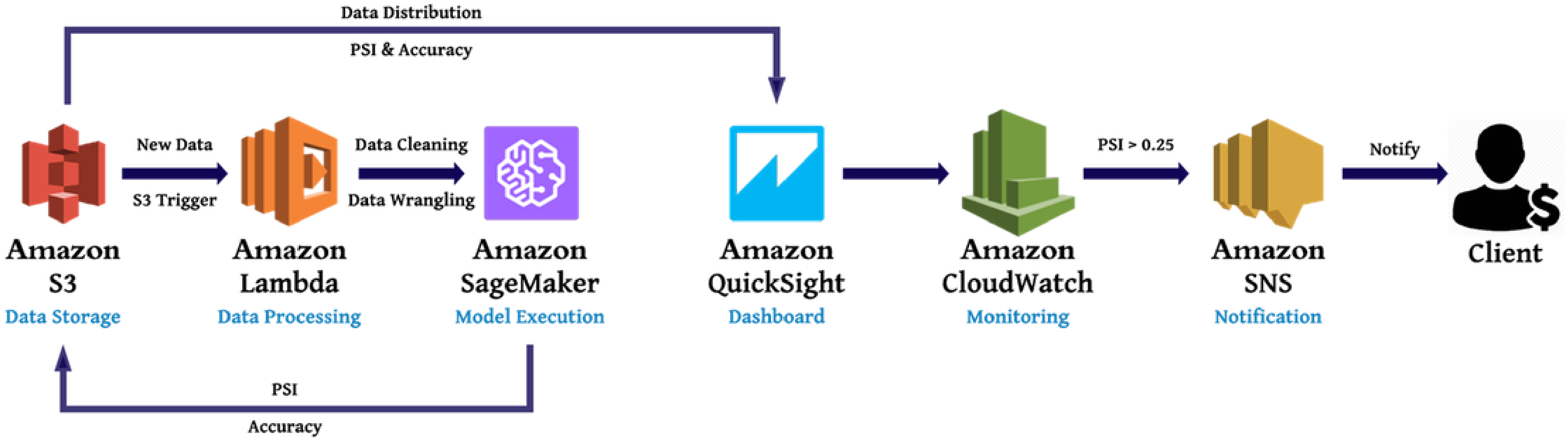




AWS Architecture

What modules are needed?
Upgrade scope?

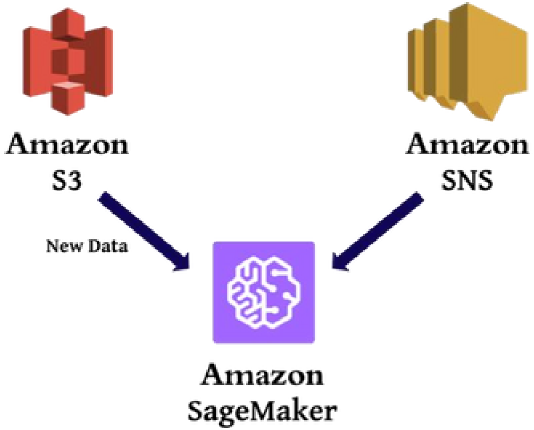
Architecture



Future

Current architecture supports to the stage of notifying the stakeholders about the change in Data distributions. This can be extended to model retuning as per business requirements and policies.

Below is the Extended Architecture to trigger model retuning



Next Steps & Use Cases

Part 1 -Once we detect the significant change in data distributions, what should we do next?

Part 2 -Real business cases that can apply our method.

Next Steps

Modify Feature

Considering Feature Importance

Retune Model

1. Fixed Training Window
2. Variable Training Window

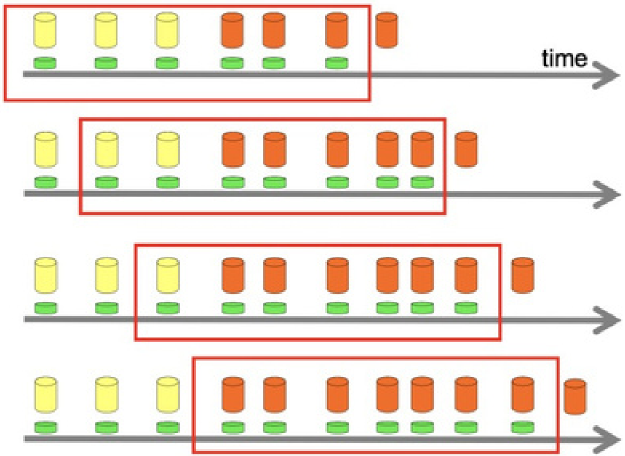
Next Steps

1. Feature Modification

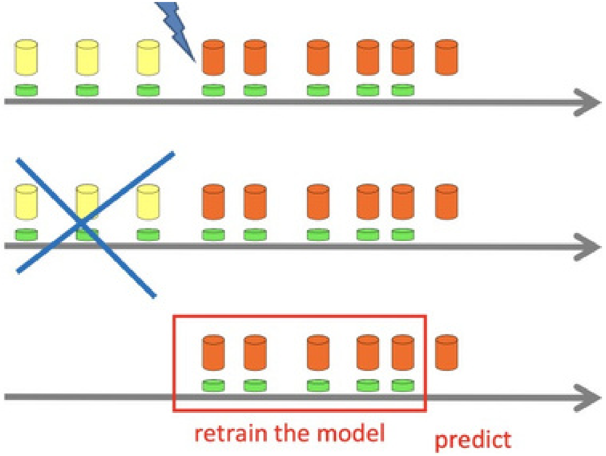
Creating new features to capture the new variation in data.

2. Model Retuning

- Fixed Training Window



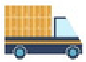
- Variable Training Window



Use Cases

Retail Industry

1. Sales Forecasting 

2. Logistic Planning 

3. Marketing Campaign 

Financial Industry

1. Credit Evaluation 

2. Fraud Detection 

3. Loan Approval