Concept Drift

The MLOps **Personas**

ML
Engineer

ML
Researcher

**Data
Scientist**

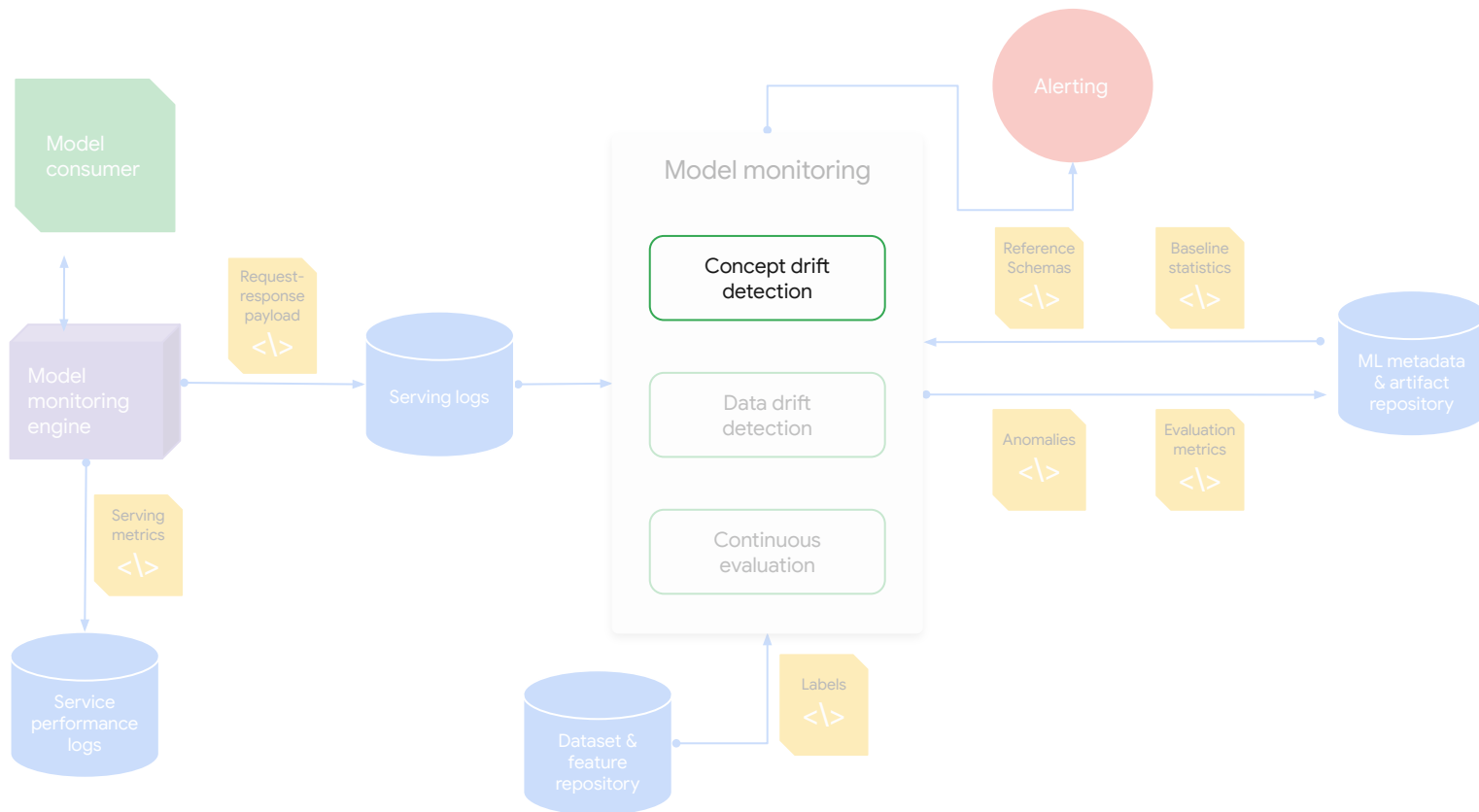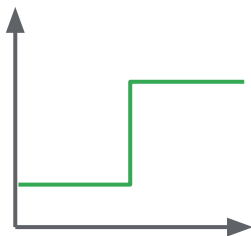Data
Engineer

Software
Engineer

DevOps

Business
Analyst

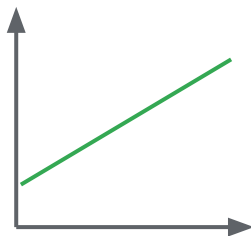# **MLOps:** Continuous Monitoring
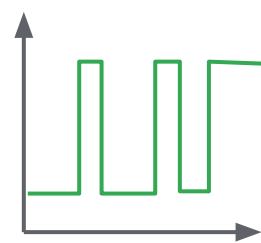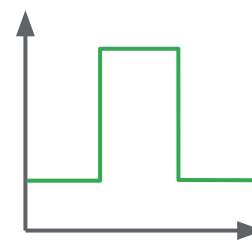
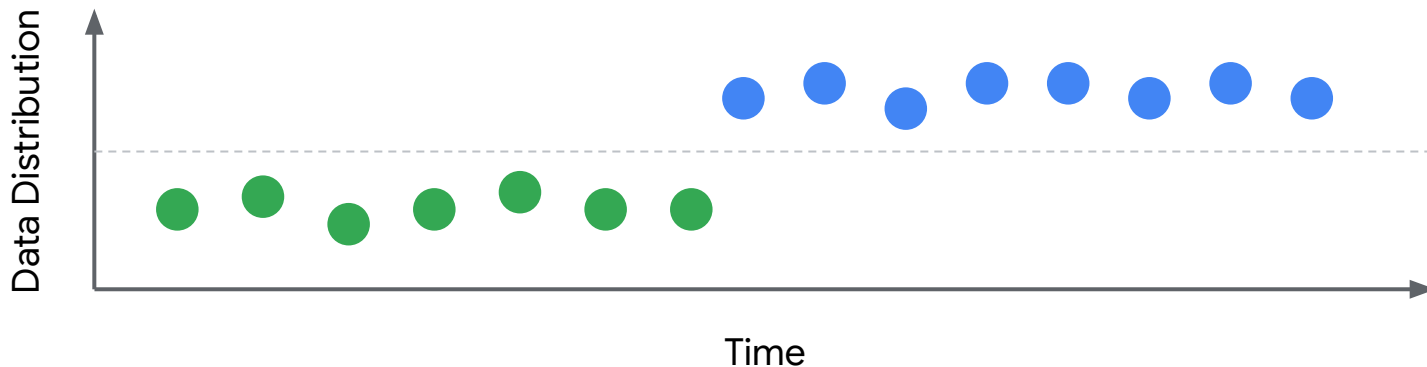# Four Major Types of Concept Changes

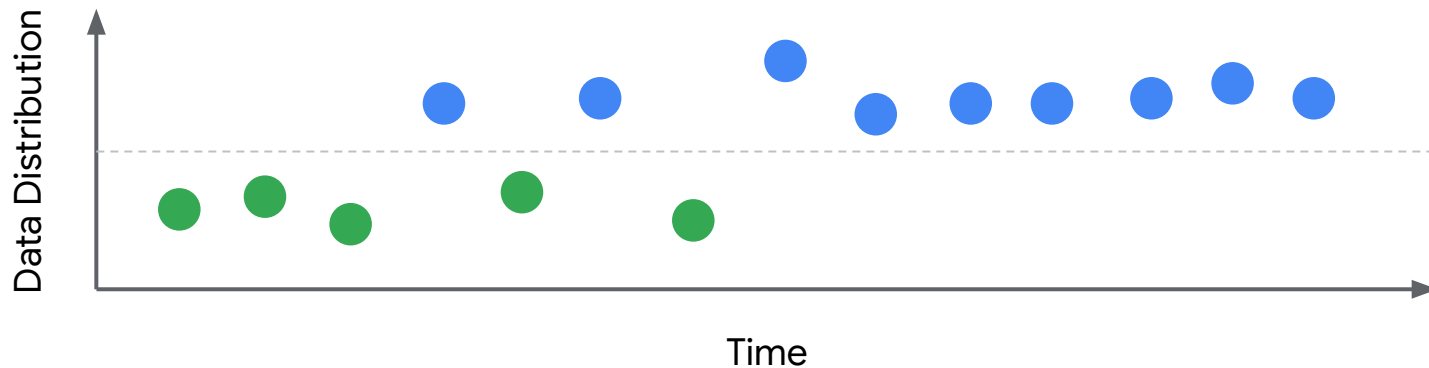sudden   incremental   gradual   recurring
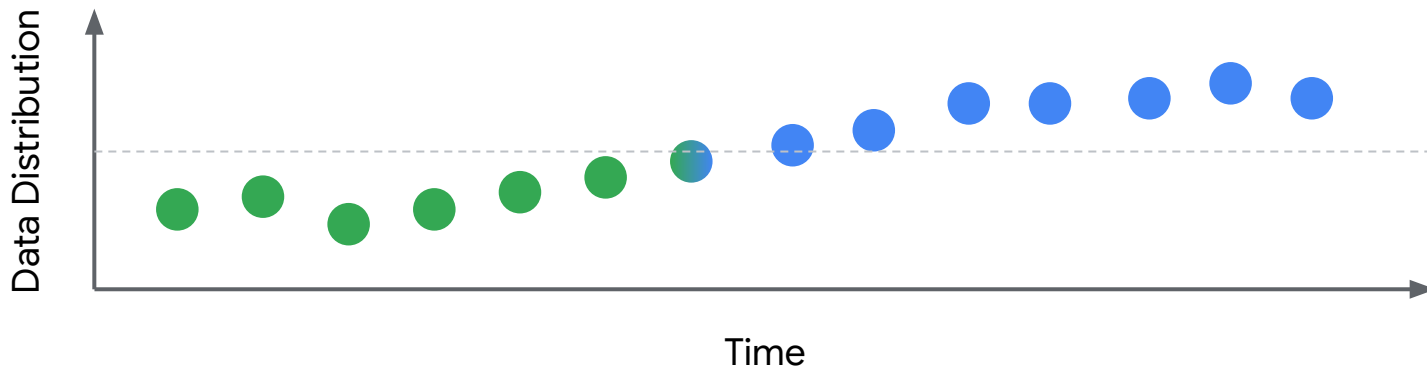
Sudden Concept Drift

A new concept occurs within a short time and completely replaces the old concept.

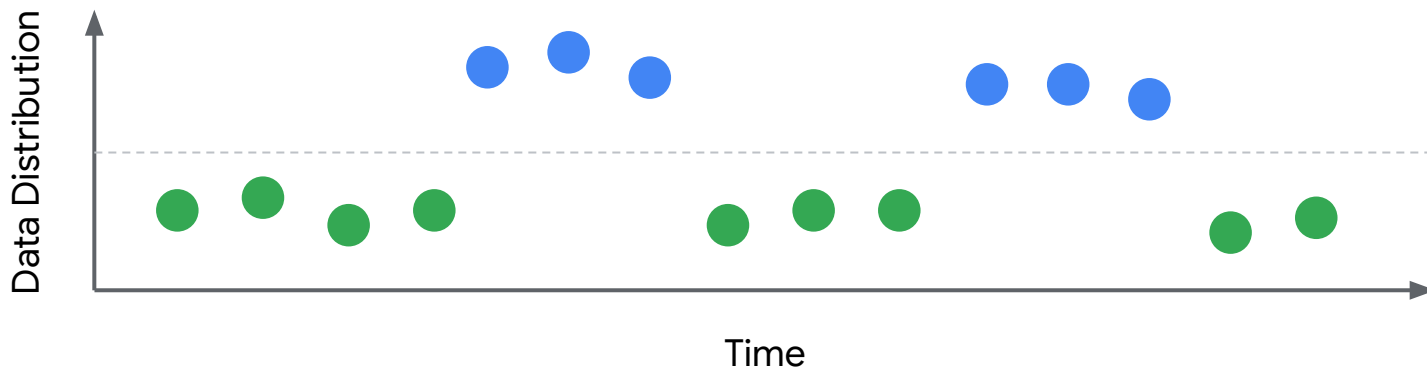# **Gradual** Concept Drift

A new concept gradually replaces an old one over a period of time.

Incremental Concept Drift

An old concept incrementally changes to a new concept over a period of time.
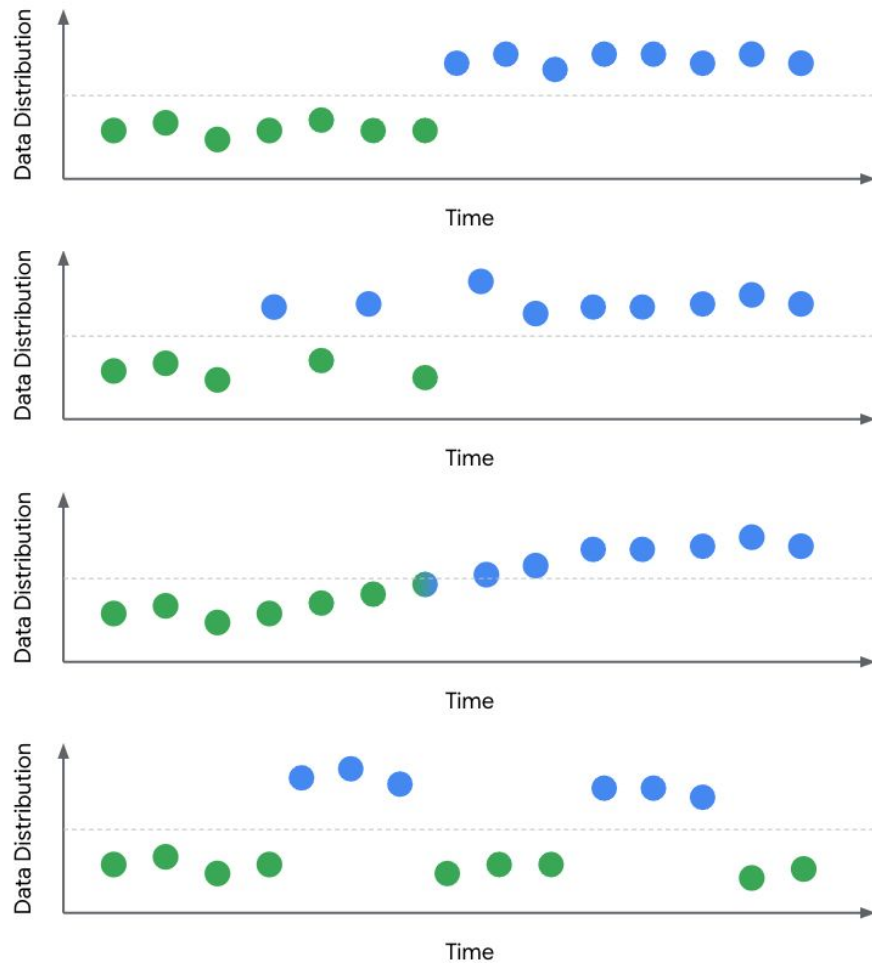
Recurring Concept Drift

An old concept may reoccur after some time with the new.

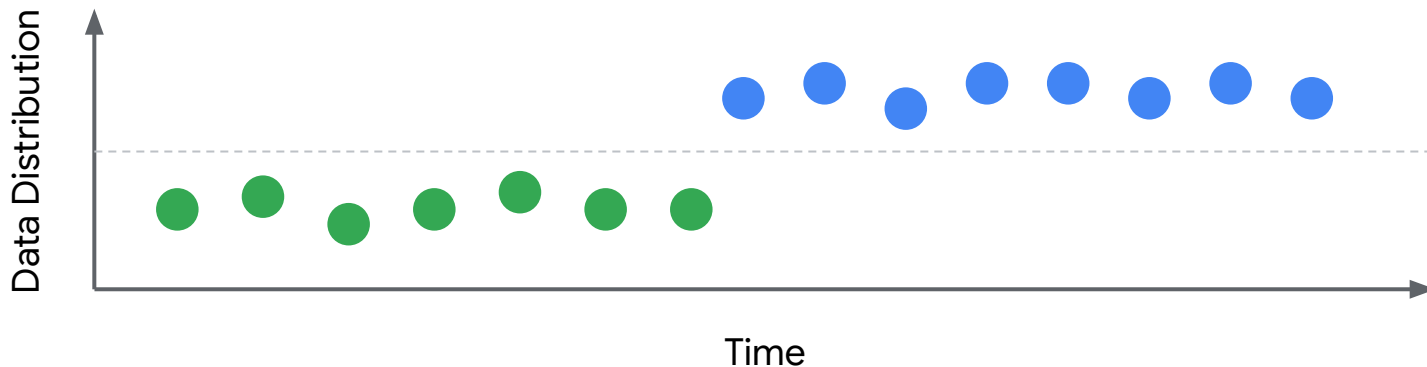# Sudden
Concept Drift

Gradual
Concept Drift

Incremental
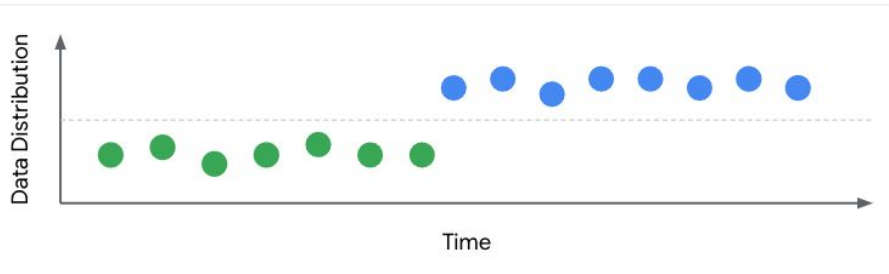Concept Drift

Recurring
Concept Drift

Sudden Concept Drift

A new concept occurs within a short time and completely replaces the old concept.

E.g. Concept Drift (COVID-19)

Concept drift in ML is when the **relationship** between the input and target changes over time.

Eat, Pray, Wash

Share of Americans who said they have done the following because of COVID-19

Washed hands or used hand sanitizer more frequently
85%

Engaged in social distancing
61%

Prayed
50%

Avoided restaurants
25%

Stockpiled food and water
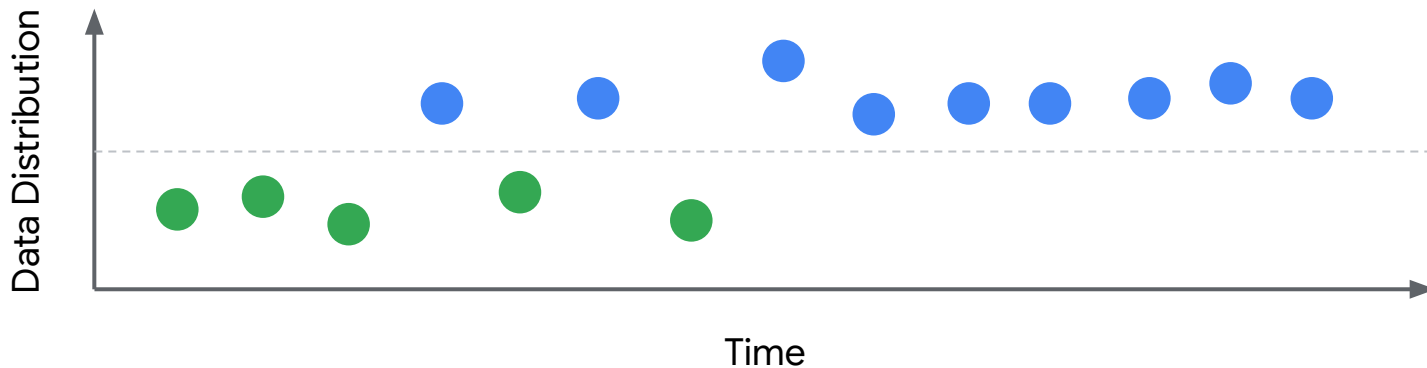22%

Worn a facemask
7%

Survey of 2,436 U.S. residents, March 10-12, 2020
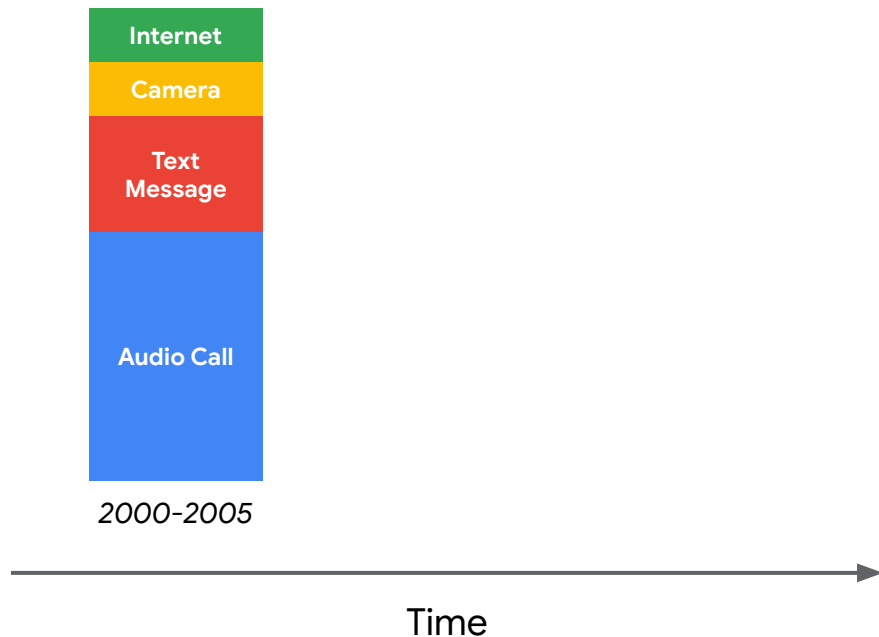Source: University of Southern California
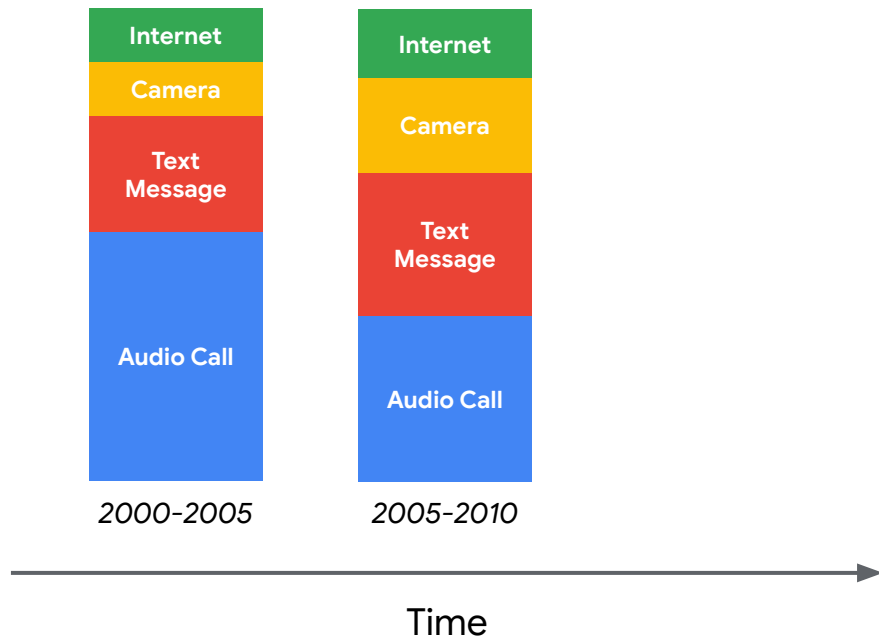
statista

Gradual Concept Drift

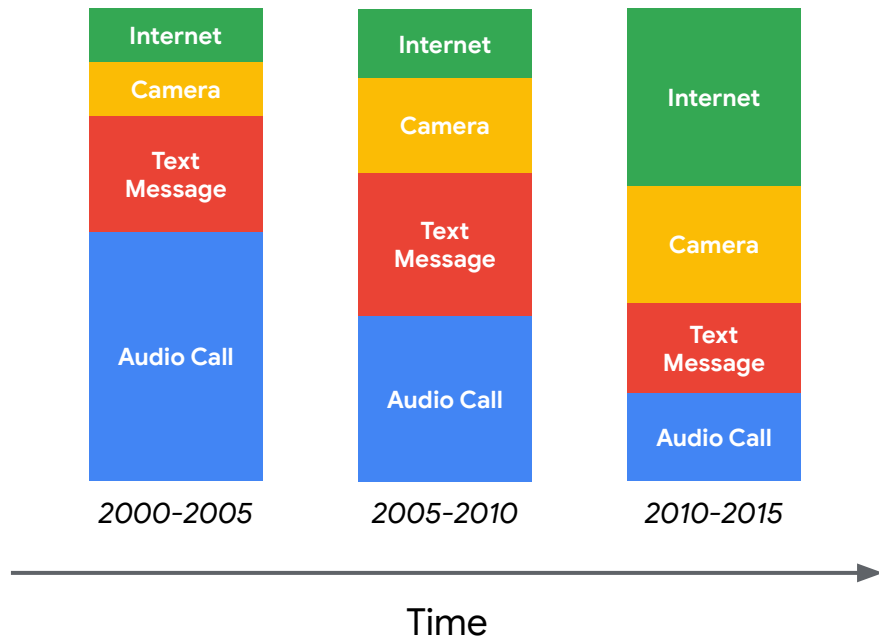*A new concept gradually replaces an old one over a period of time.*

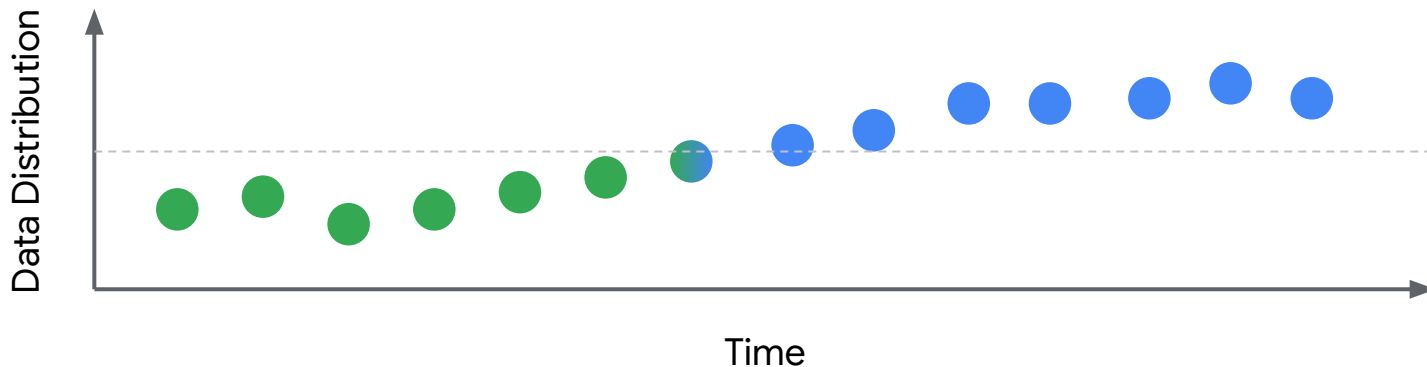# **Gradual** Concept Drift in the "Real World"

Internet

Camera

Text Message

Audio Call

2000–2005

Time

Gradual Concept Drift in the "Real World"

Internet	Internet
Camera	Camera
Text Message	Text Message
Audio Call	Audio Call
2000-2005	*2005-2010*

Time

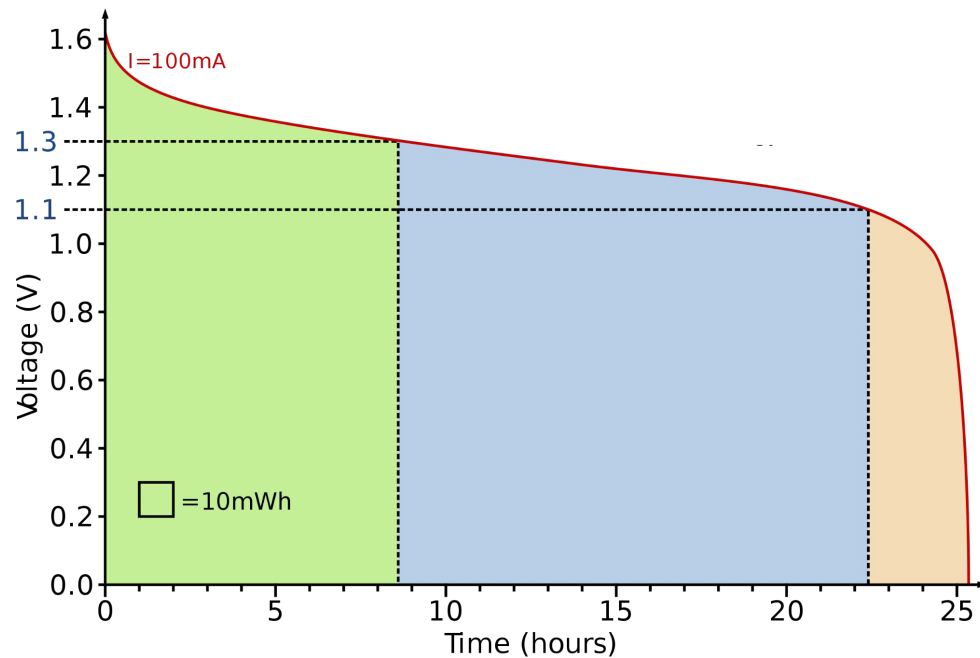# **Gradual** Concept Drift in the "Real World"
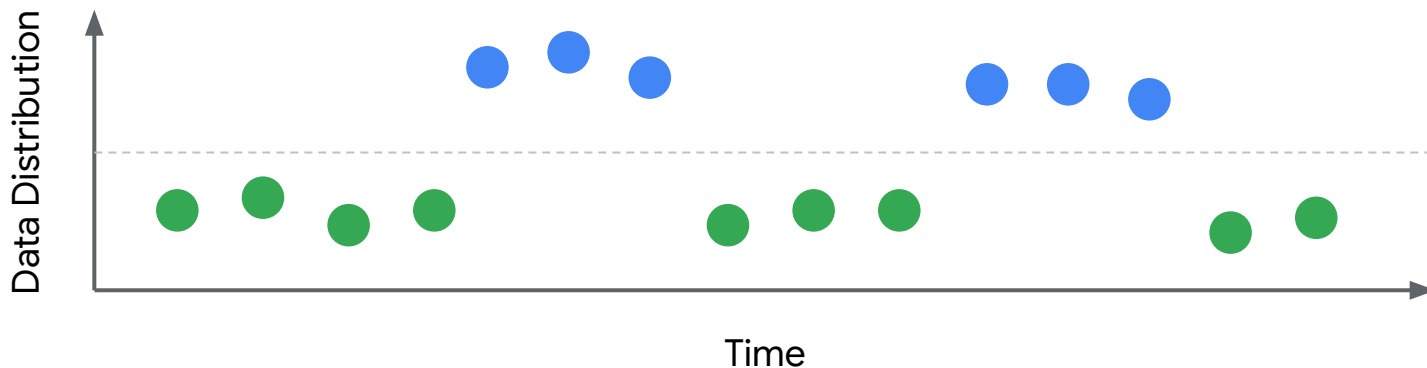
Incremental Concept Drift

An old concept incrementally changes to a new concept over a period of time.

Incremental Concept Drift
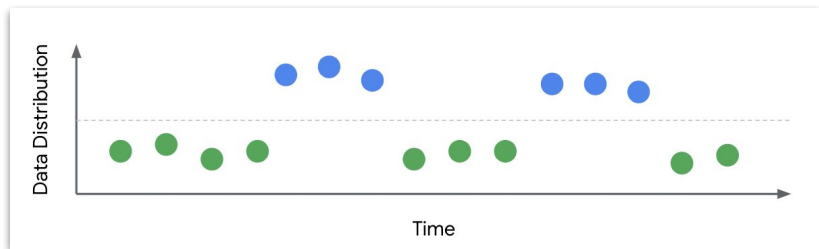
Recurring Concept Drift

An old concept may reoccur after some time with the new.
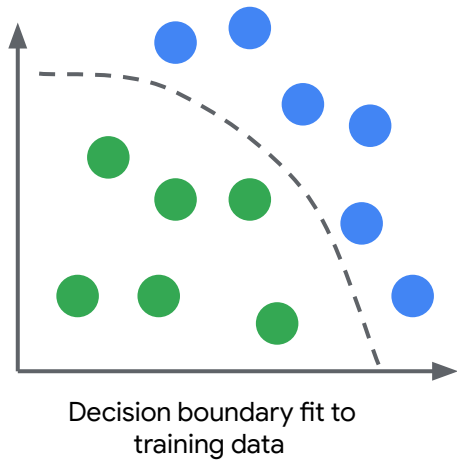
Seasonal Depression

Seasonal affective disorder (SAD) is a type of depression that's related to seasonal changes
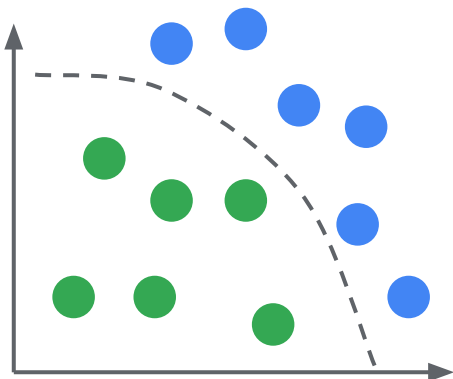
SAD begins and ends at about the same times

SAD symptoms start in the fall and continue into the winter months, but then recovers

Why All This Matters

Decision boundary fit to
training data

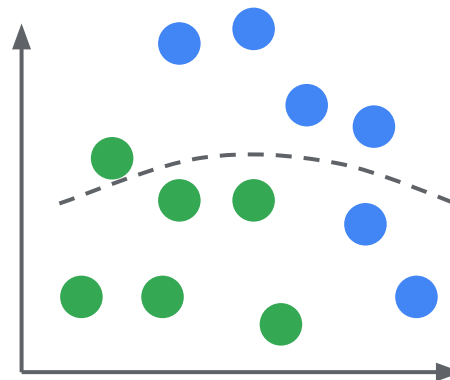# Why All This Matters

Decision boundary fit to
training data

Concept drift,
detrimental performance impact