Data Drift Detection

Data Drift: When production data distribution **differs from training data**

Covariate Shift

`P(X) changes`

Input distribution changes

> 💡 *Example: New imaging equipment with different resolution/contrast*

Label Shift

`P(Y) changes`

Output distribution changes

> 💡 *Example: Seasonal disease prevalence changes*

Concept Drift

`P(Y|X) changes`

Relationship between input and output changes

> 💡 *Example: Treatment protocols evolve, outcomes change*

Feature Drift

`Individual features change`

Specific feature distributions shift

> 💡 *Example: Patient demographics shift over time*

🔍 Detection Methods

- KS Test (Kolmogorov-Smirnov)
- Chi-Square Test
- PSI (Population Stability Index)
- Wasserstein Distance
- KL Divergence