

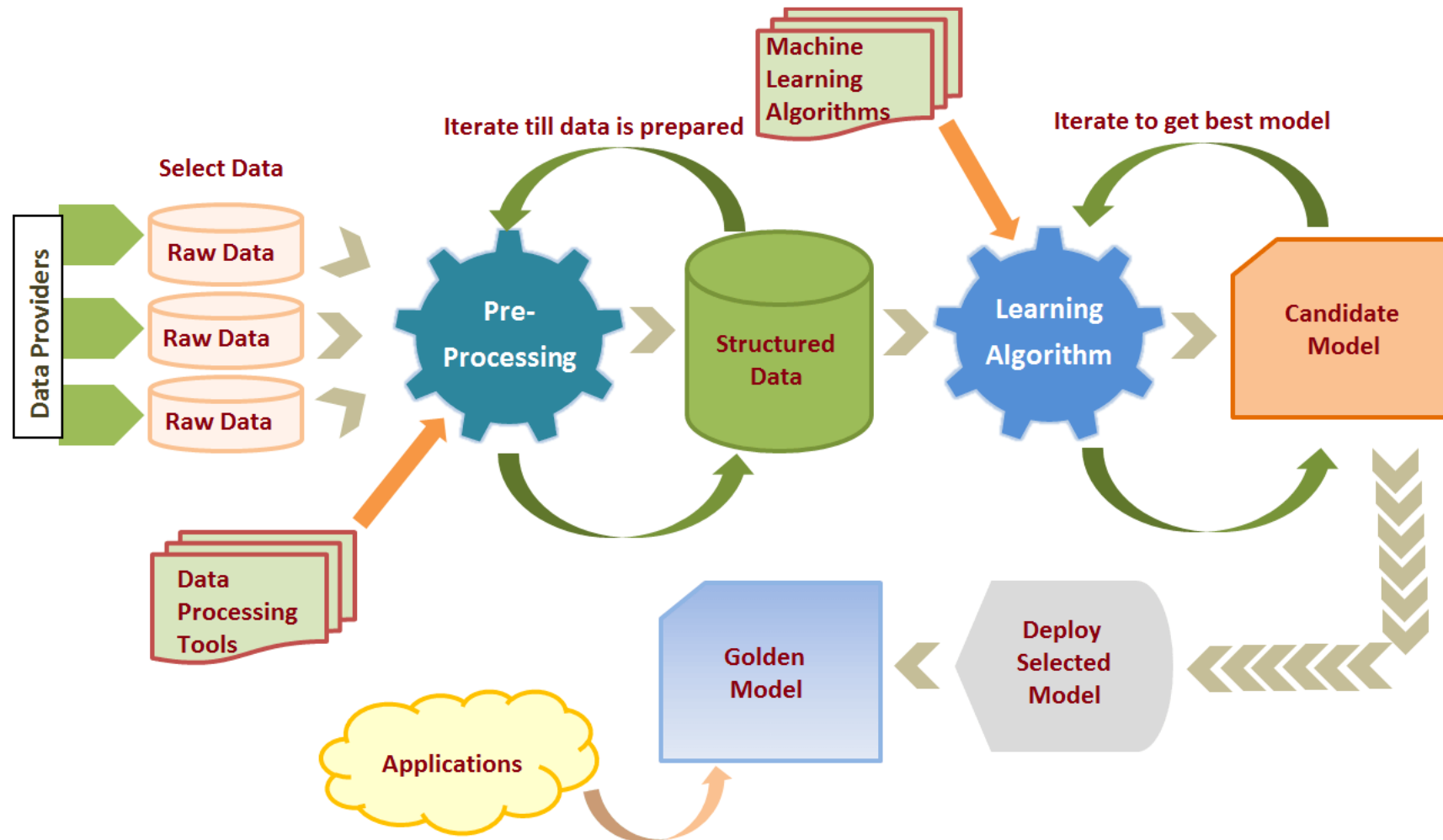
Unit II: Feature Management



Royal University of Bhutan

CTE309 Machine Learning
AS2024: BE Information Technology

Machine Learning Pipeline



Overview

- Introduction
- Role of feature scaling
- Why feature scaling?
- Feature scaling techniques

Introduction

- a vital pre processing step in machine learning
 - involves transforming numerical features to a common scale.
- It plays a major role in ensuring accurate and efficient model training and performance.
- Scaling techniques aim to
 - normalize the range, distribution, and magnitude of features,
 - reducing potential biases and inconsistencies that may arise from variations in their values.
- the process of transforming the numerical features of a dataset into a standardized range.

Role of Feature Scaling

- Many machine learning algorithms use distance-based calculations to make predictions.
 - If the features are not scaled, those with larger values can have a disproportionate impact on the results.
- Feature scaling can help improve the convergence speed and performance of some optimization algorithms.
- This helps in handling skewed data and outliers, which can influence the model's behavior.

Why feature scaling?

- Enhance Model performance
- Addressing skewed data and outliers
- Faster convergence During training
- Balanced feature influence
- Improved algorithm behavior

Feature scaling techniques

- Normalization
 - Min-max scaling
 - Transforms the feature to a range between 0 & 1
 - $X_{\text{scaled}} = (X - X_{\text{min}}) / (X_{\text{max}} - X_{\text{min}})$

Feature	Value
Feature1	10
Feature2	20
Feature3	15
Feature4	30



Feature	Value
Feature1	0.0
Feature2	0.333
Feature3	0.167
Feature4	1.0

Feature scaling techniques

- Standardization
 - Z-score normalization
 - Transforms features to have zero mean and unit variance.
 - $X_{\text{scaled}} = (X - X_{\text{mean}}) / X_{\text{std}}$

Feature	Value
Feature1	10
Feature2	20
Feature3	15
Feature4	30



Feature	Value
Feature1	-1.161
Feature2	0.387
Feature3	-0.387
Feature4	1.161

References

- <https://medium.com/@yashbaravaliya206/feature-scaling-and-normalization-ca484a16882a>
- <https://medium.com/@shivanipickl/what-is-feature-scaling-and-why-does-machine-learning-need-it-104eedebbb1c9#:~:text=Feature%20scaling%20is%20a%20vital,efficient%20model%20training%20and%20performance>.

Thank you