

# Iris Flower Classification

An overview of machine learning techniques for classifying Iris species.

c by Charmi Polak



# Data Loading and Preparation



## Load Data

The Iris dataset is loaded, containing flower measurements.



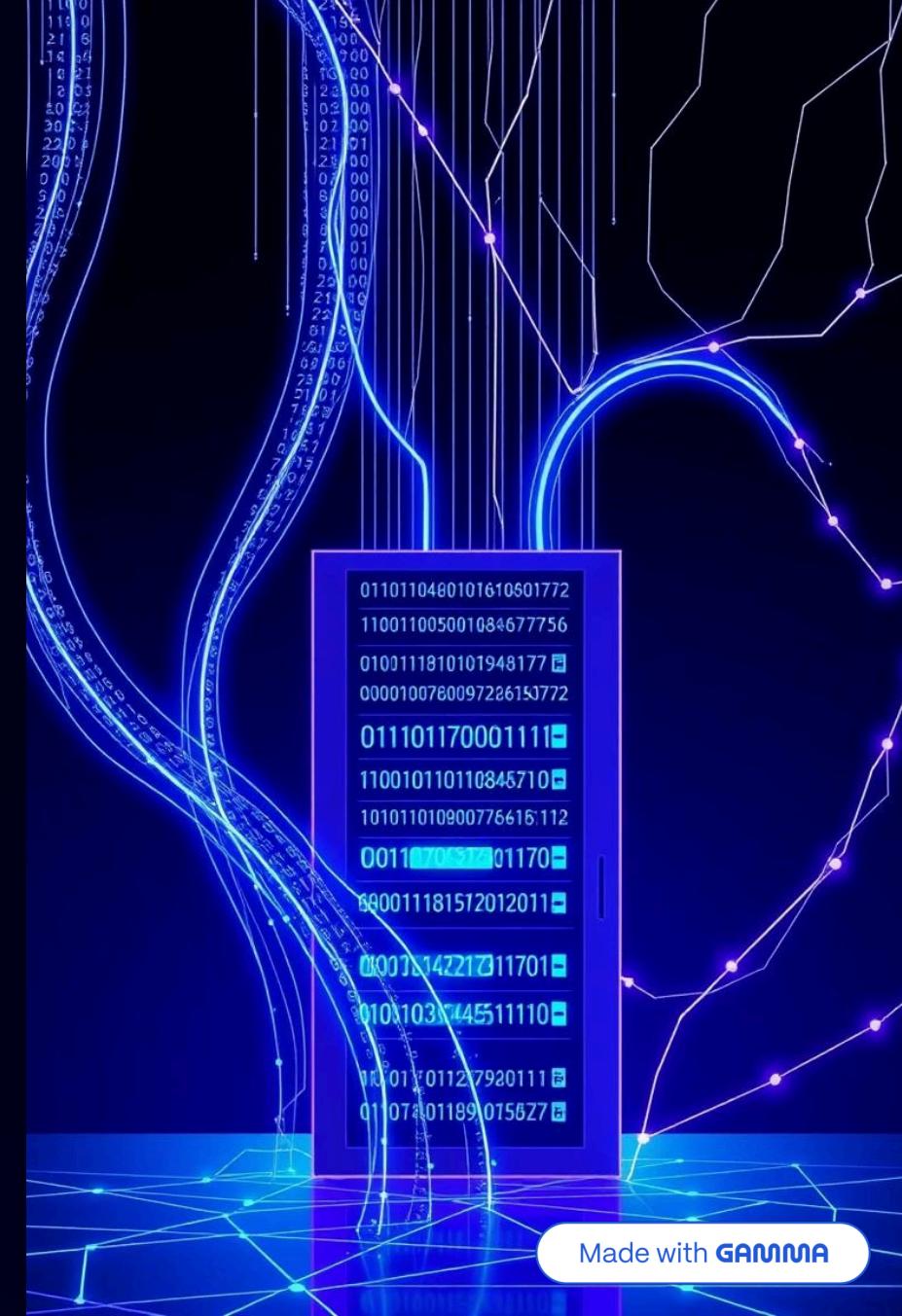
## Create DataFrame

Features and target are organized into a Pandas DataFrame.



## Add Species Labels

Numerical targets are mapped to their corresponding species names.



# Exploratory Data Analysis

## Pairplot Visualization

A pairplot shows relationships between features for each species.

It helps visualize data distribution and potential class separation.

## Correlation Heatmap

A heatmap displays feature correlations.

This helps identify highly related features, aiding model selection.

# Training Set

Training Set

# Testing Set

Testing Set

## Data Splitting and Scaling



### Separate Features

Features ( $X$ ) and target ( $y$ ) are extracted from the dataset.



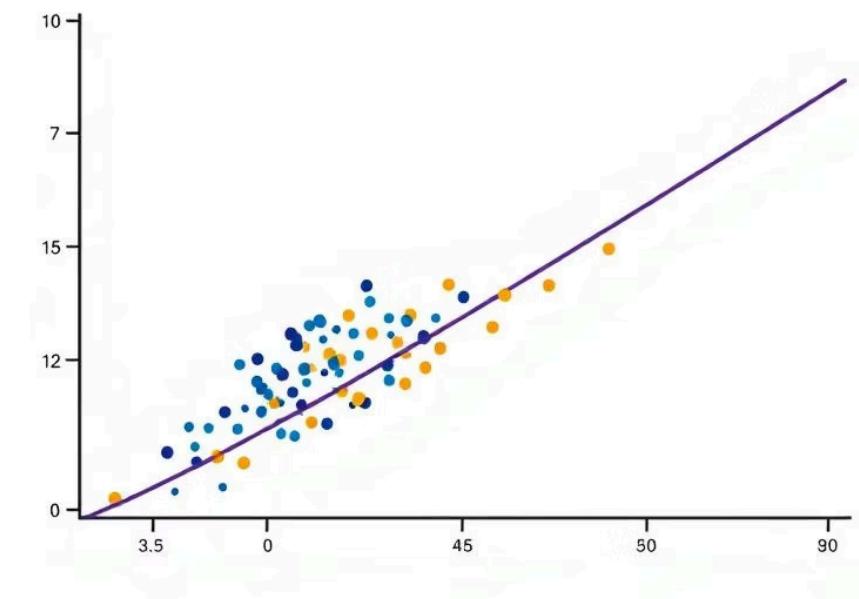
### Train-Test Split

Data is divided into training (80%) and testing (20%) sets.



### Standardize Features

Features are scaled to have zero mean and unit variance.



# Logistic Regression Model



## Model Initialization

A Logistic Regression model is created.



## Training

The model learns from the scaled training data.



## Prediction

Predictions are made on the unseen test data.

# K-NEAREST NEIGHBORS

## K-Nearest Neighbors (KNN)

### KNN Algorithm

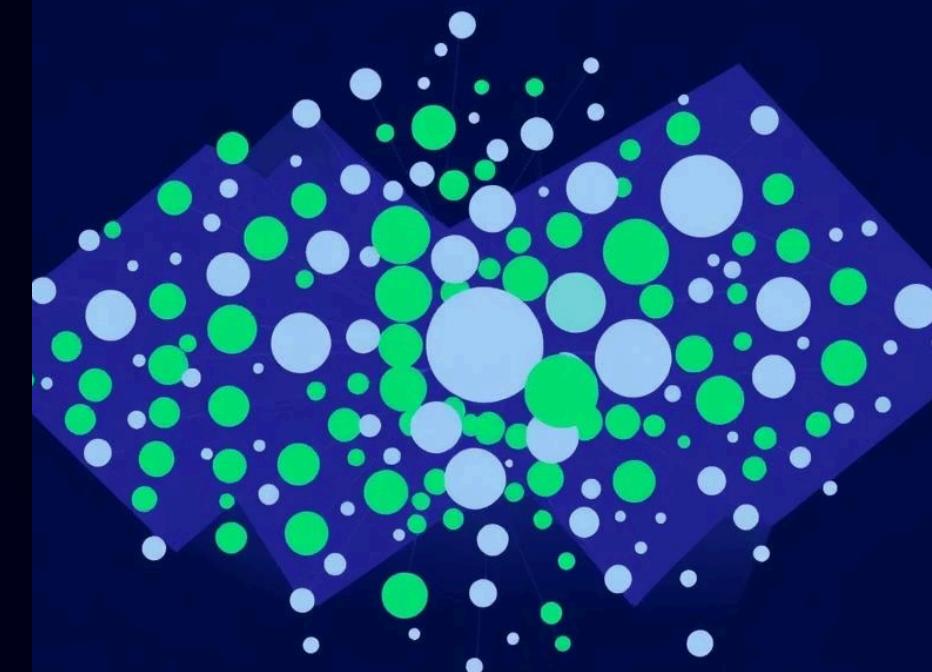
Classifies data points based on their nearest neighbors.

### Neighbor Count

The model uses 3 nearest neighbors for classification.

### Model Training

The KNN model is trained on the prepared data.



# Decision Tree Classifier

## Tree Structure

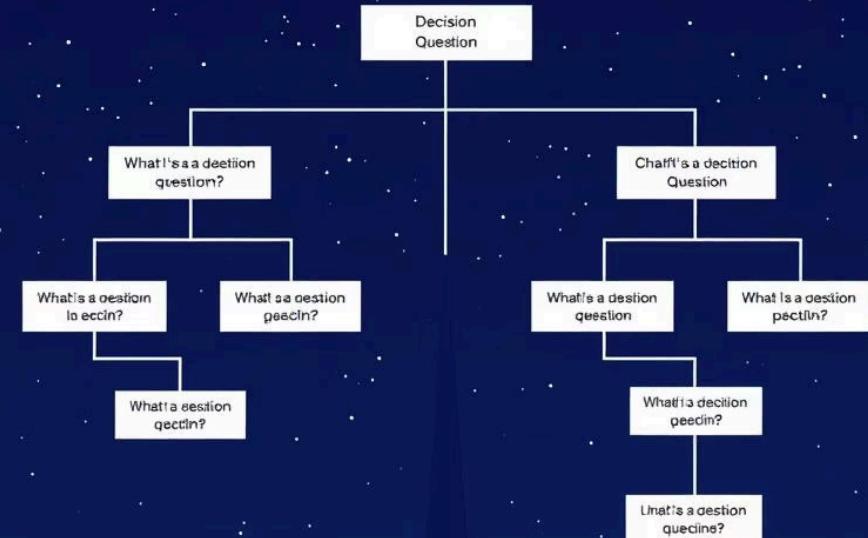
The model learns decision rules from features.

## Training Process

The Decision Tree is fitted to the training data.

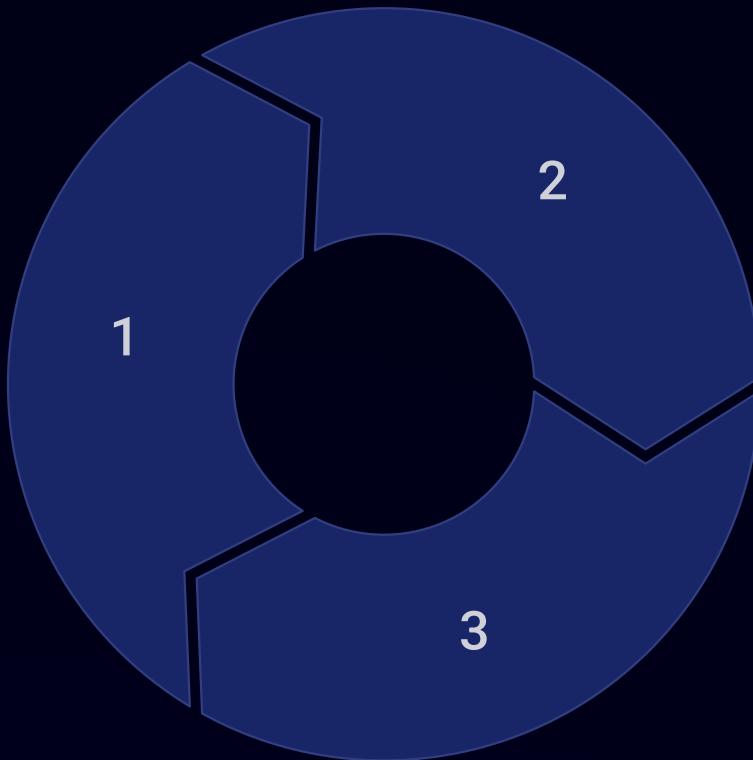
## Making Predictions

It then predicts species for the test set.



# Support Vector Machine (SVM)

**SVM Training**  
The SVM model is trained to find optimal hyperplanes.



## Prediction

It then classifies new data points based on these planes.

## Confusion Matrix

A confusion matrix visualizes SVM's classification performance.

# Model Visualization

## Decision Boundary

Visualizes how Logistic Regression separates classes.

Shows the model's learned decision regions.

## Decision Tree Plot

Displays the structure of the trained Decision Tree.

Reveals the rules used for classification.

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# Model Performance Comparison

1.0

Accuracy

All models achieved perfect accuracy on the test set.

1.0

Precision

All models showed perfect precision for each class.

1.0

Recall

All models demonstrated perfect recall for each class.