

AI + Generative AI

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MACHINE
LEARNING



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Machine Learning with GitHub

4 Months

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Intro to ML

- ✧ What is ML in AI
- ✧ Types: Sup/Unsup/RL
- ✧ ML workflow overview
- ✧ Python role in ML
- ✧ Install ML libraries
- ✧ Why GitHub for ML



Data Basics

- ✧ Load CSV datasets
- ✧ Work with Excel data
- ✧ Handle JSON files
- ✧ Fetch data via APIs
- ✧ Explore datasets shape
- ✧ Preview dataset rows

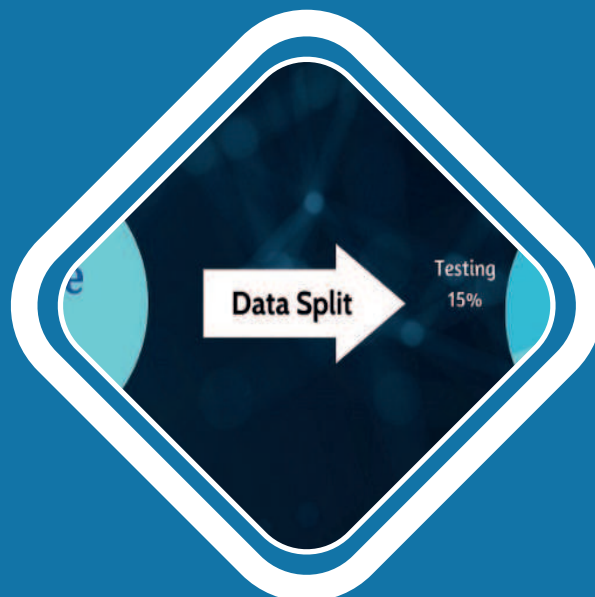
Data Cleaning

- ✧ Handle missing data
- ✧ Drop null values
- ✧ Fill missing values
- ✧ Encode categories
- ✧ Normalize features
- ✧ Standardize features



Data Splitting

- ★ Train/test split
- ★ Validation dataset
- ★ Cross-validation intro
- ★ Shuffle dataset rows
- ★ Stratified sampling
- ★ Holdout evaluation

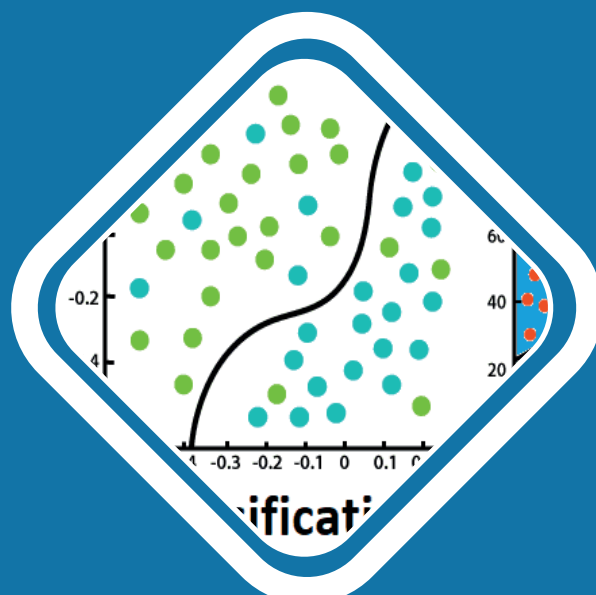


Regression Models

- ★ Linear Regression
- ★ Polynomial Regression
- ★ Evaluate with RMSE
- ★ Predict house prices
- ★ Visualize predictions
- ★ Save regression model

Classification Models

- ★ Logistic Regression
- ★ KNN algorithm basics
- ★ Decision Trees intro
- ★ Random Forest basics
- ★ Evaluate Accuracy
- ★ Precision & Recall



Unsupervised ML

- ★ K-Means clustering
- ★ Hierarchical clusters
- ★ DBSCAN algorithm
- ★ PCA dimensionality
- ★ t-SNE visualization
- ★ Customer segmentation



Model Tuning

- ★ Feature selection
- ★ Regularization intro
- ★ L1 and L2 basics
- ★ Hyperparameter tuning
- ★ Grid Search usage
- ★ Random Search usage

Avoiding Overfit

- ★ Overfit explained
- ★ Underfit explained
- ★ Bias vs Variance
- ★ Early stopping intro
- ★ Cross-validation tips
- ★ Regularization tricks



ML Libraries

- ★ Scikit-learn usage
- ★ Statsmodels basics
- ★ XGBoost algorithm
- ★ LightGBM overview
- ★ Joblib for saving
- ★ Pickle for models



GitHub for ML

- ★ Create ML repo
- ★ Push dataset to repo
- ★ Track ML experiments
- ★ Use Copilot for ML
- ★ AI code suggestions
- ★ Document ML project

Capstone Project

- ★ Pick ML problem
- ★ End-to-end pipeline
- ★ Model train & eval
- ★ Push code to GitHub
- ★ Debug ML workflow
- ★ Build ML portfolio



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