

โครงการอบรมเชิงปฏิบัติการ

การพัฒนาศักยภาพบุคลากร

สาขาวิชานิติศาสตร์

เพื่อเตรียมความพร้อมทางด้านวิทยาการข้อมูล

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What is data science?

- ✓ The discipline of extracting meaningful insights from data
- ✓ Combines mathematics, statistics, computer science, and domain knowledge
- ✓ Supports strategic decision-making

Data Science Tools



Programming languages: Python, R, SQL



Development platforms: Jupyter Notebook, RStudio



Visualization tools: Matplotlib, Seaborn, Tableau, Power BI



Databases: MySQL, PostgreSQL, MongoDB



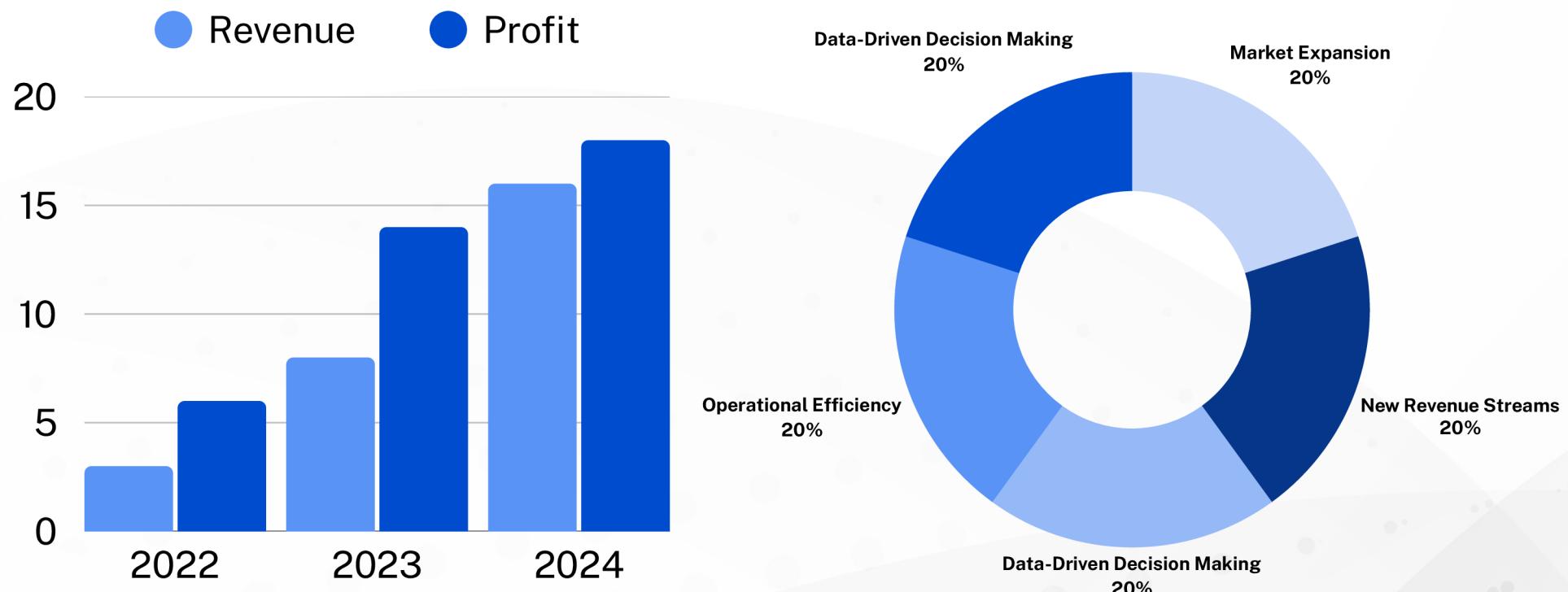
Machine Learning libraries: Scikit-learn, TensorFlow, PyTorch



Data Science Methodology

Overview of the Data Science Lifecycle

- Structured workflow to guide data science projects
- Ensures that work is goal-oriented and repeatable



Main stages:

- **From Problem to Approach**
- **From Requirements to Collection**
- **From Modeling to Evaluation**
- **From Deployment to Feedback**

What is Machine Learning

Supervised Learning

Uses labeled data (e.g., price prediction, email classification).

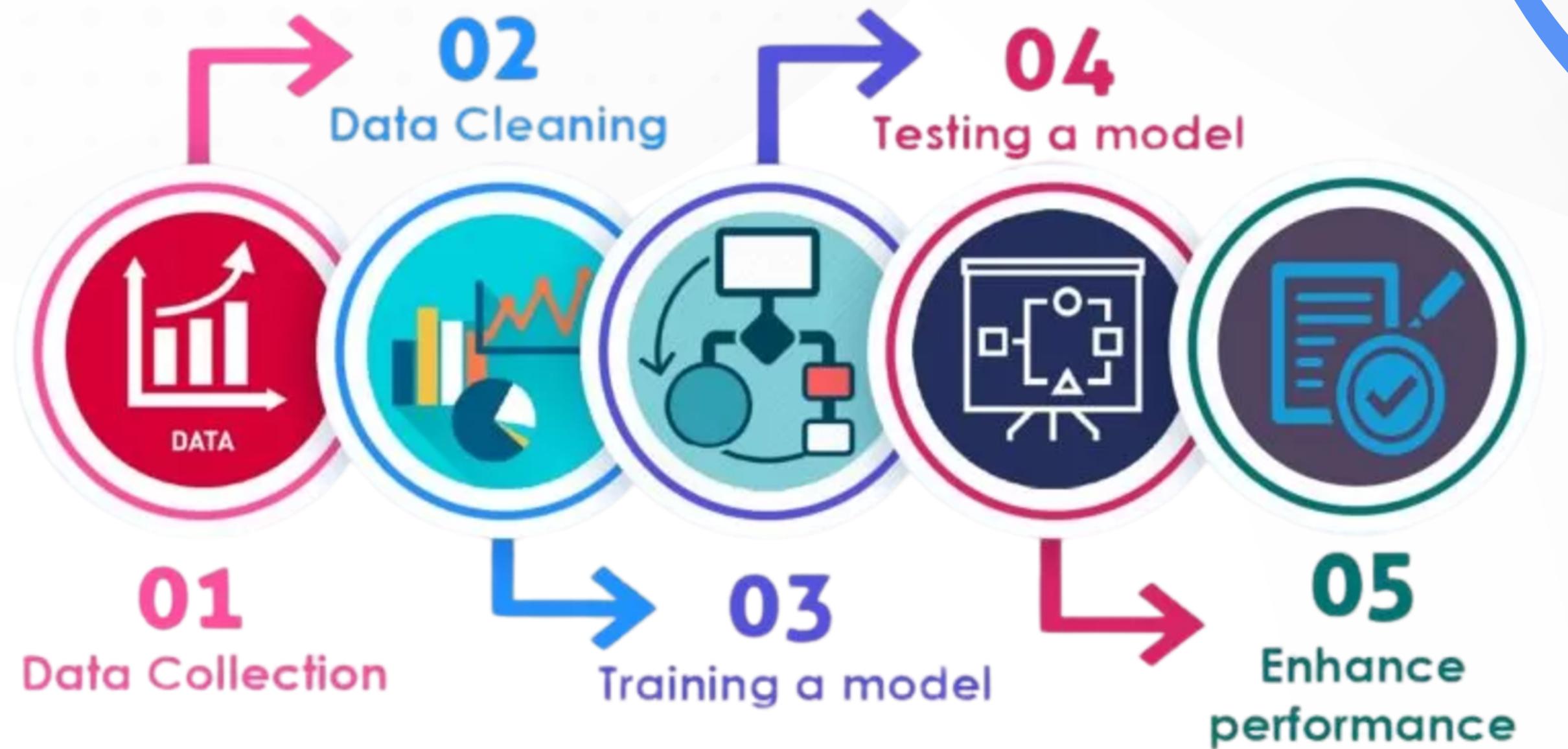
Unsupervised Learning

Finds patterns in unlabeled data (e.g., customer segmentation).

Cross-Functional Collaboration

Learns from rewards (e.g., game-playing robots).

Steps to Build a Machine Learning Model



Confusion Matrix



		Actual Values	
		Positive	Negative
Predicted Values	Positive	True Positive	False Positive
	Negative	False Negative	True Negative

How to Evaluate a Model?

- **Accuracy:** $\frac{\text{Correct Predictions}}{\text{Total Predictions}}$
- **Precision:** $\frac{TP}{TP+FP}$
- **Recall:** $\frac{TP}{TP+FN}$
- **F1-Score:** Harmonic mean: $2 \cdot \frac{\text{Precision} \cdot \text{Recall}}{\text{Precision}+\text{Recall}}$

All formulas derive from core mathematical reasoning involving ratios and set theory.



Data Science Methodology in Action

1. From Problem to Approach

- Understand the business problem
- Define a clear data science question
- Choose the right approach (descriptive, predictive, etc.)

2. From Requirements to Collection

- Identify required data
- Collect data from databases, APIs, web scraping
- Check for completeness and relevance

3. From Modeling to Evaluation

- Build models using ML algorithms
- Split data: training vs testing
- Evaluate with metrics (accuracy, RMSE, etc.)

4. From Deployment to Feedback

- Deploy models to apps, dashboards, APIs
- Monitor performance and collect user feedback
- Improve the model iteratively





Thank You