BICOL UNIVERSITY COLLEGE OF SCIENCE

CS Elective – Artificial Intelligence

Supervised and Unsupervised Machine Learning

CANONIZADO, MICHAEL XAVIER, E.

Case Study #1 - Hospital Diagnostics

A hospital has a labeled dataset of patients' symptoms, lab tests, and diagnosis (e.g., flu, dengue, pneumonia).

They want to create a system that suggests a probable diagnosis for new patients.

Questions

1. Is this supervised or unsupervised learning? Why?
   - This is supervised learning because the dataset includes labeled outcomes: correct or incorrect diagnosis.

2. What type of supervised learning task is this: classification or regression?
   - This is a classification task because the goal is to assign each patient to a specific disease.

3. Name two algorithms that could be used.
   - Logistic Regression
   - Decision Tree

Why is labeled data critical in this case?

- It provides the ground truth the model must learn from and the model needs correct diagnoses to understand which symptom–lab patterns correspond to which diseases.

Case Study # 2 - Online Retail Store

A store wants to segment customers into groups based on behavior:

- ✓ Purchase frequency
- ✓ Amount spent
- ✓ Browsing patterns
- ✓ Cart abandonment rate

- There are no predefined labels.

Questions

1. Which learning approach applies here?
   - This is unsupervised learning because there are no predefined labels. The goal is to discover hidden patterns or natural groupings in customer behavior.

2. Which unsupervised method is most appropriate?
   - K-Means Clustering
   - Hierarchical Clustering

3. How can segmentation benefit marketing strategies?
   - It enables personalized promotions, improves customer retention, and enhanced product recommendations.

Case #3 - School Chatbot

A university wants to create a chatbot that categorizes student questions into topics such as:

- ✓ Enrollment
- ✓ Tuition fees
- ✓ Grades
- ✓ Guidelines
- ✓ Student services

They have thousands of labeled example questions.

Questions

1. What type of machine learning applies?
   - This is supervised learning because the chatbot is trained on labeled example questions, where each question is already assigned to a specific topic.

2. What supervised algorithm could be used for text classification?
   - Logistic Regression
   - Neural Networks

3. What advantage do labeled examples give in this context?
   - Provide clear guidance on which types of questions belong to which category and enables the model to learn language patterns, keywords, and phrasing associated with each topic.