جامـــــعة المـــــستقبل
AL MUSTAQBAL UNIVERSITY

قســـم الامـــــن الـــــــــسيبرانـــــــي

Department of Cyber Security

Subject:

Data Science

Class:

First

Lecturer:

Asst. lect. Mustafa Ameer Awadh

Lecture: (12)

Introduction

Data Science is an interdisciplinary field that combines statistical analysis, machine learning, data visualization, and domain knowledge to extract insights from structured and unstructured data. It is widely used in industries such as healthcare, finance, marketing, and technology.

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2. Components of Data Science

a. Data Collection

- **Gathering raw data from various sources like databases, APIs, web scraping, and IoT devices.**
- **Structured vs. Unstructured Data.**

b. Data Processing & Cleaning

- **Handling missing values, duplicate records, and incorrect data.**
- **Data transformation techniques such as normalization and encoding.**

c. Exploratory Data Analysis (EDA)

- **Understanding the dataset using statistical summaries and visualizations.**
- **Identifying trends, patterns, and correlations.**

d. Machine Learning & Modeling

- **Supervised Learning: Classification and Regression.**
- **Unsupervised Learning: Clustering and Dimensionality Reduction.**
- **Model evaluation using metrics like accuracy, precision, and recall.**

e. Data Visualization

- **Using tools like Matplotlib, Seaborn, and Tableau to present insights in graphs and charts.**
- **Importance of storytelling with data.**

3. Tools & Technologies in Data Science

- **Programming Languages: Python, R, SQL**
- **Libraries & Frameworks: Pandas, NumPy, Scikit-learn, TensorFlow**
- **Big Data Technologies: Hadoop, Spark**
- **Cloud Platforms: AWS, Google Cloud, Azure**

4. Applications of Data Science

a. Healthcare

- **Predicting diseases using patient history.**
- **Personalized treatment recommendations.**

b. Finance

- **Fraud detection in banking transactions.**
- **Stock market predictions.**

c. Marketing

- **Customer segmentation for targeted advertisements.**
- **Sentiment analysis of social media data.**

d. Autonomous Systems

- **Self-driving cars.**
- **AI-powered chatbots and recommendation systems.**

5. Future Trends in Data Science

- **Advancements in Artificial Intelligence and Deep Learning.**
- **Growth of Edge Computing and Real-Time Analytics.**

- **Ethical AI and Responsible Data Science.**

Conclusion

Data Science is a rapidly evolving field with applications in almost every industry. Mastering its components, tools, and techniques can lead to innovative solutions and impactful decisions.
