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BASIC MACHINE LEARNING FOR DATA ANALYTICS

As an Analytics professional, you already know how to derive insights from data. Machine Learning (ML) takes this further by allowing you to **predict future trends** and automate decisions.

Today, I wanted to share with you some basic concepts of ML to help **bridge the gap** between analytics and ML, giving you the tools to enhance your impact in the data world.

Let's dive in...

1. What is Machine Learning?

Machine Learning (ML) is a powerful subset of artificial intelligence that enables computers to learn from data, identify patterns, and make predictions or decisions.

Unlike traditional data analytics, which focuses on interpreting past data, ML is geared toward predicting future outcomes and automating decision-making processes.

- **Learning from Data:**
 - a. ML models continuously improve as they are exposed to more data, unlike static analytical models.
- **Prediction vs. Description:**
 - a. While data analytics answers questions like "What happened?" ML answers "What might happen?" and "What should we do about it?"

2. Basic Concepts in Machine Learning

- **Supervised Learning:**
 - a. Involves training models on labeled datasets (where the outcome is known).
 - b. Example: Predicting house prices based on historical data.
- **Unsupervised Learning:**
 - a. Finds patterns in data without predefined labels.
 - b. Example: Segmenting customers based on purchase behavior.
- **Features and Labels:**
 - a. In ML, 'features' are the inputs (e.g., customer age, income), and 'labels' are the outcomes (e.g., customer churned/dropped off the platform).

3. Common Machine Learning Algorithms

- Linear Regression:

- a. A fundamental ML algorithm that predicts continuous outcomes by modeling a linear relationship between input features and the target variable.

- Decision Trees:

- a. A tree-like model of decisions used for classification and regression.

- k-Nearest Neighbors (k-NN):

- a. Classifies data points based on their proximity to other points.

- Clustering Algorithms:

- a. Techniques like k-means to group similar data points together.

4. Steps to Build a Simple ML Model

- Data Collection:
 - As with analytics, the quality of your data impacts the accuracy of your ML model.
- Data Preparation:
 - Clean, transform, and sometimes scale your data for better model performance.
- Model Selection:
 - Choose an algorithm that best suits your problem.
- Training the Model:
 - Feed the algorithm with data so it can learn.
- Model Evaluation:
 - Test the model's accuracy using a separate dataset.

5. Tools for Machine Learning

- Python:
 - a. A versatile language used in both data analytics and ML. Libraries like scikit-learn are essential for implementing ML algorithms.
- Jupyter Notebooks:
 - a. Ideal for writing code, visualizing data, and documenting the ML process.
- TensorFlow & PyTorch:
 - a. Libraries for building advanced models, particularly in deep learning.

6. Key Differences between Analytics and ML

- Focus:
 - a. Analytics is retrospective, focusing on interpreting past data, while ML is predictive.
- Automation:
 - a. ML models can automate decision-making, reducing the need for constant human intervention.
- Complexity:
 - a. ML introduces additional layers of complexity, such as hyperparameters, overfitting, and cross-validation, which aren't typically encountered in traditional analytics.

7. Starting Your ML Journey

- Learn Python:
 - a. If you're not already familiar with Python, now is the time to start. It's crucial for both data analytics and ML.
- Explore Simple Models:
 - a. Begin with linear regression and decision trees before progressing to more complex algorithms.
- Work on Projects:
 - a. Apply your new skills by working on real-world projects. Platforms like Kaggle offer many opportunities.
- Understand the Math:
 - a. A solid grasp of statistics and linear algebra will significantly aid your ML journey.



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