Introduction to Machine Learning

Machine Learning allows systems to learn and improve from experience without being explicitly programmed. It involves algorithms and statistical models used to perform tasks by making predictions or decisions.

Key Concepts

1. Types of Machine Learning

- **Supervised Learning**: Learning from labeled data.
  - **Classification**: Predicting a category. Example: Spam detection.
  - **Regression**: Predicting a continuous value. Example: House prices.
- **Unsupervised Learning**: Learning from unlabeled data.
  - **Clustering**: Grouping similar data points. Example: Customer segmentation.
  - **Association**: Finding relationships between variables. Example: Market basket analysis.
- **Reinforcement Learning**: Learning through rewards and penalties. Example: Game playing AI.

2. Key Steps in Machine Learning

- **Data Collection**: Gathering data relevant to the problem.
- **Data Preparation**: Cleaning and organizing data for analysis.
- **Feature Engineering**: Selecting and transforming variables.
- **Model Training**: Applying an algorithm to learn from data.
- **Model Evaluation**: Assessing the model's performance.
- **Model Deployment**: Implementing the model in a real-world scenario.

3. Code example

```
data = pd.read_csv('dataset.csv')

X = data.drop('target', axis=1)
y = data['target']

 X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)

model = RandomForestClassifier()
model.fit(X_train, y_train)
```