

Machine Learning: A Slide Overview

- **Definition**
 - Intersection of applied mathematics (statistics, optimization) and computer science
 - Algorithms that “learn” to predict from data without explicit programming
- **Why Use ML?**
 - Tackles tasks impractical to encode by hand (e.g., image recognition under varying conditions)
- **Learning Paradigms**
 - **Supervised:** Model trains on labeled examples (e.g., apples vs. bananas)
 - **Unsupervised:** Model identifies patterns or clusters without labels
- **Key Questions**
 - *Supervised:* How can we generalize known labels to new data?
 - *Unsupervised:* How are data distributed or grouped?
- **Applications**
 - From fruit classification to healthcare diagnostics, finance, NLP, and beyond