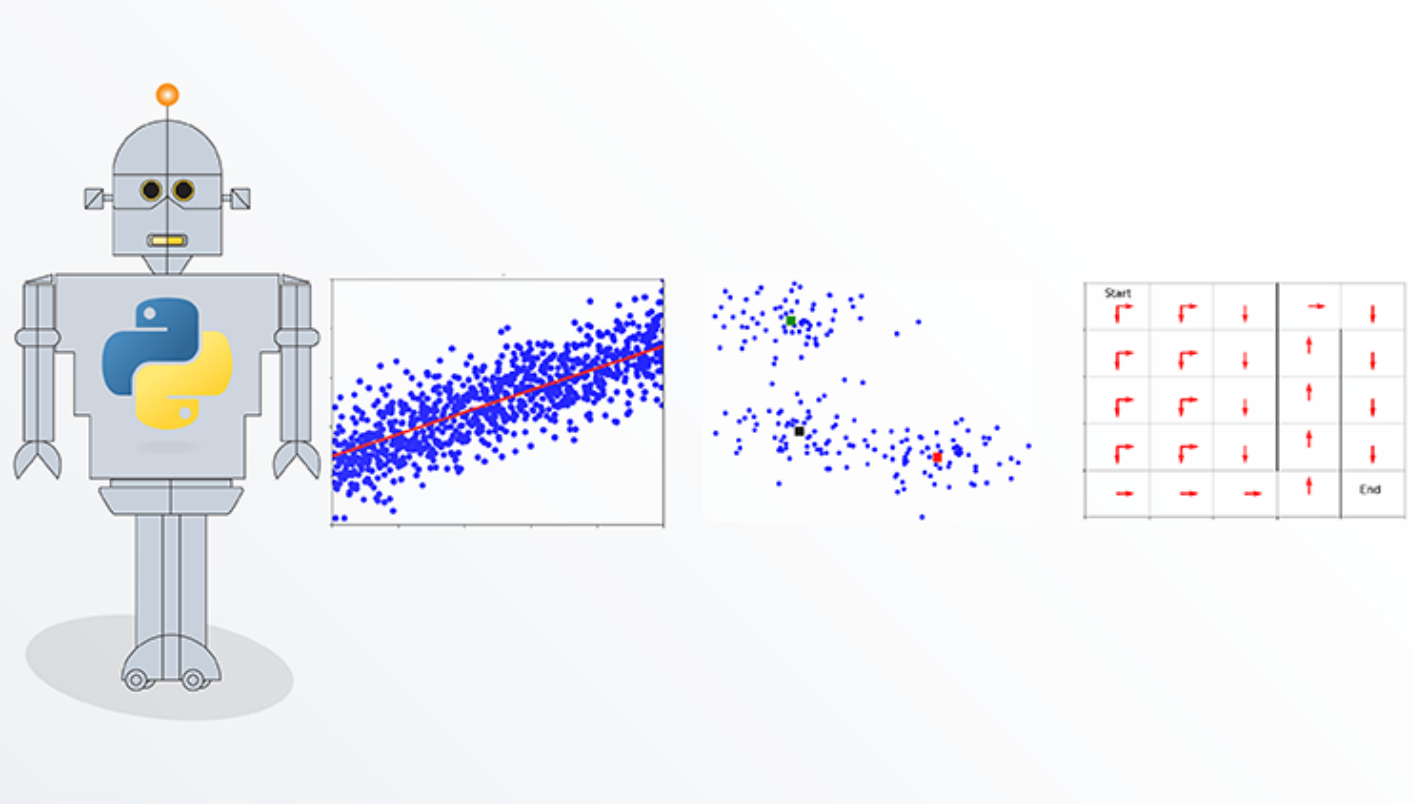
# What is Machine Learning?

# Chapter 1: Introduction



# Machine Learning: What is it?

Formal definitions (from Wikipedia page on Machine Learning)

- Machine Learning is the study of algorithms and statistical models that computer systems use to perform a specific task without using explicit instructions, relying on patterns and inference instead
- Machine Learning algorithms build a mathematical model based on training data in order to make predictions without being explicitly programmed for the task

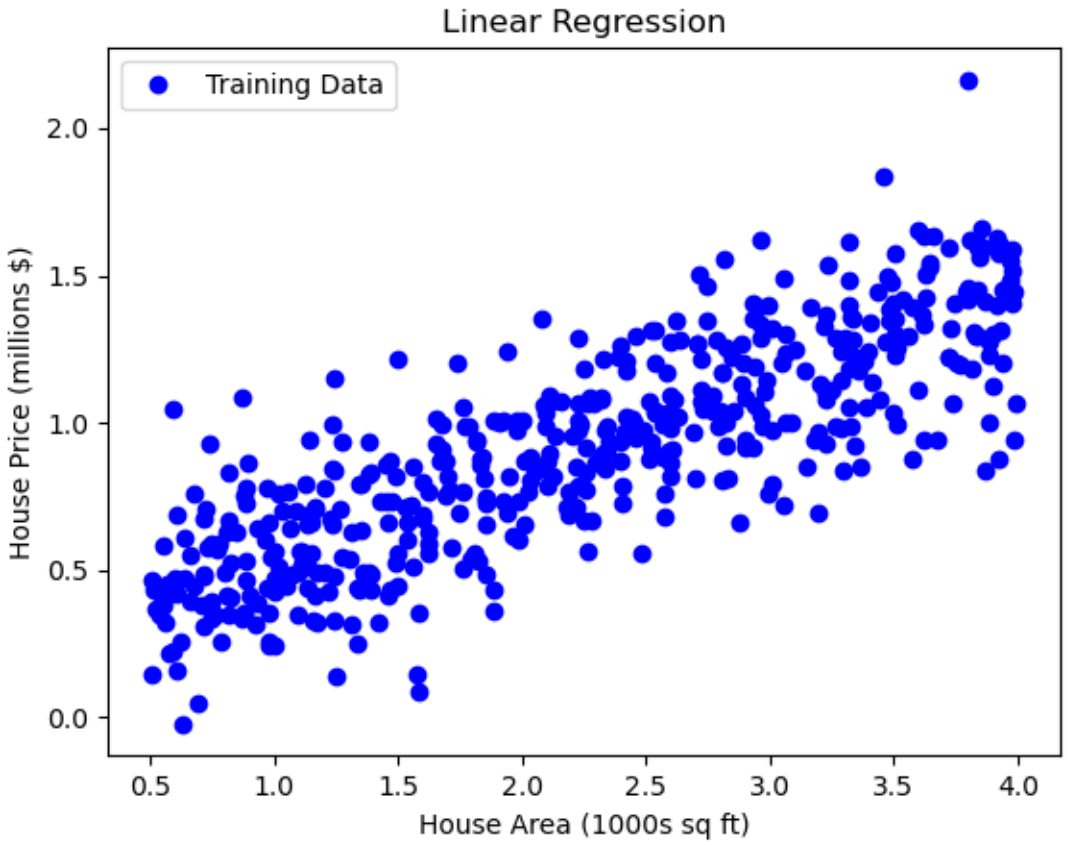
# Machine Learning: Types

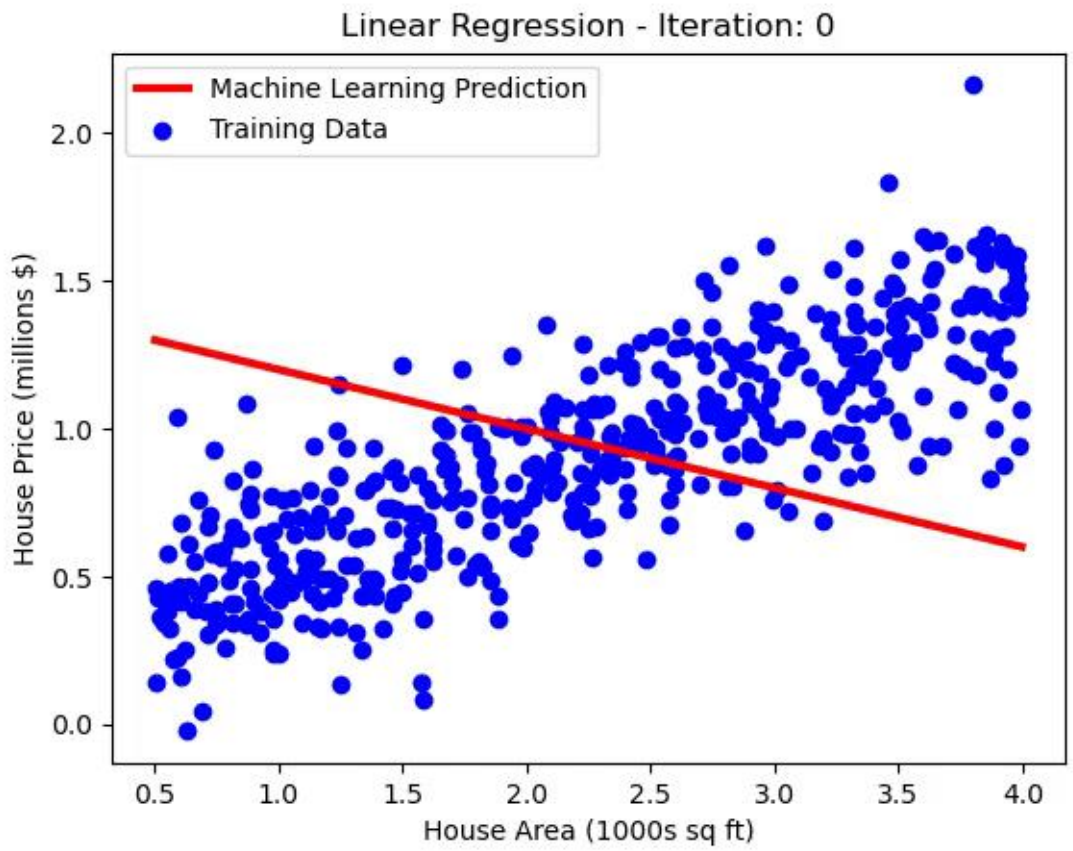
Three broad areas of machine learning:

- Supervised Machine Learning
  - Informally: Learn function that “fits” the data, then use for prediction
  - Applications: predicting house prices, spam filtering, image classification, language translation
- Unsupervised Machine Learning
  - Informally: Learn patterns in data
  - Applications: finding clusters, data mining, anomaly detection
- Reinforcement Learning
  - Informally: Learn strategies to maximize reward
  - Applications: game playing (tic-tac-toe, checkers, chess, go), industrial control

# Supervised Learning: Example

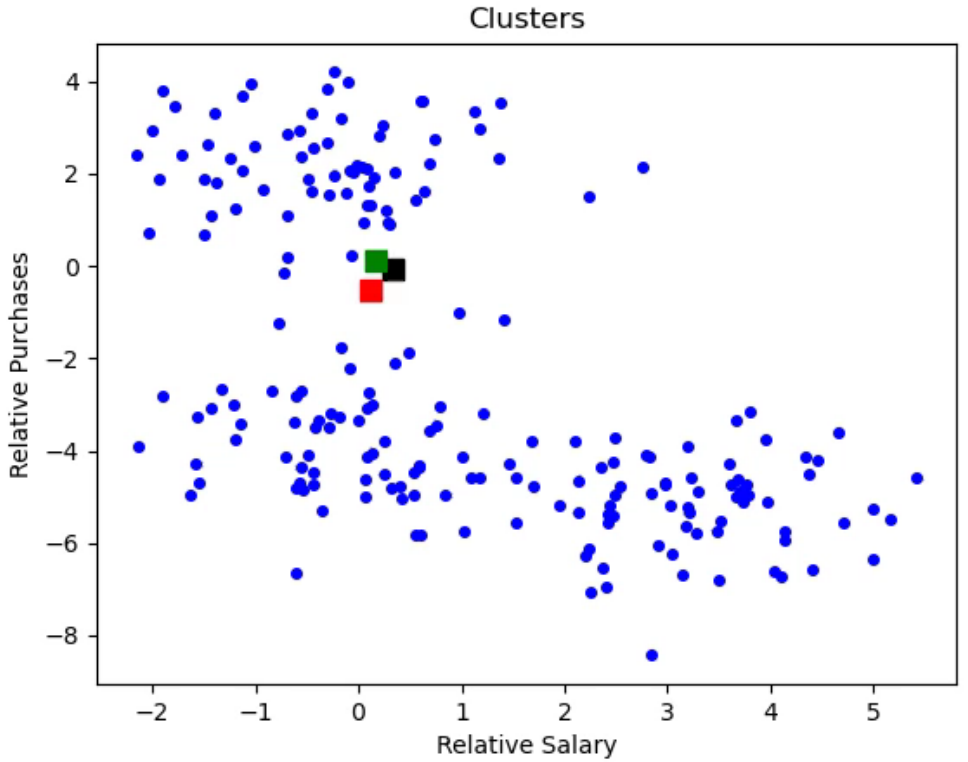
- Example: Linear Regression for house price prediction



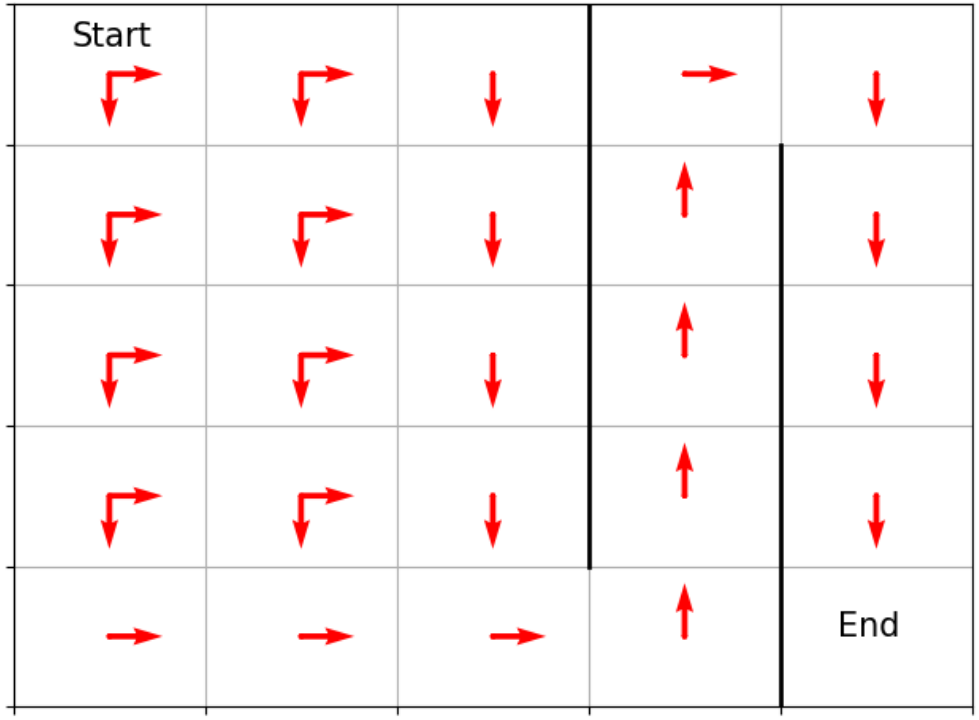
# Unsupervised Learning: Example

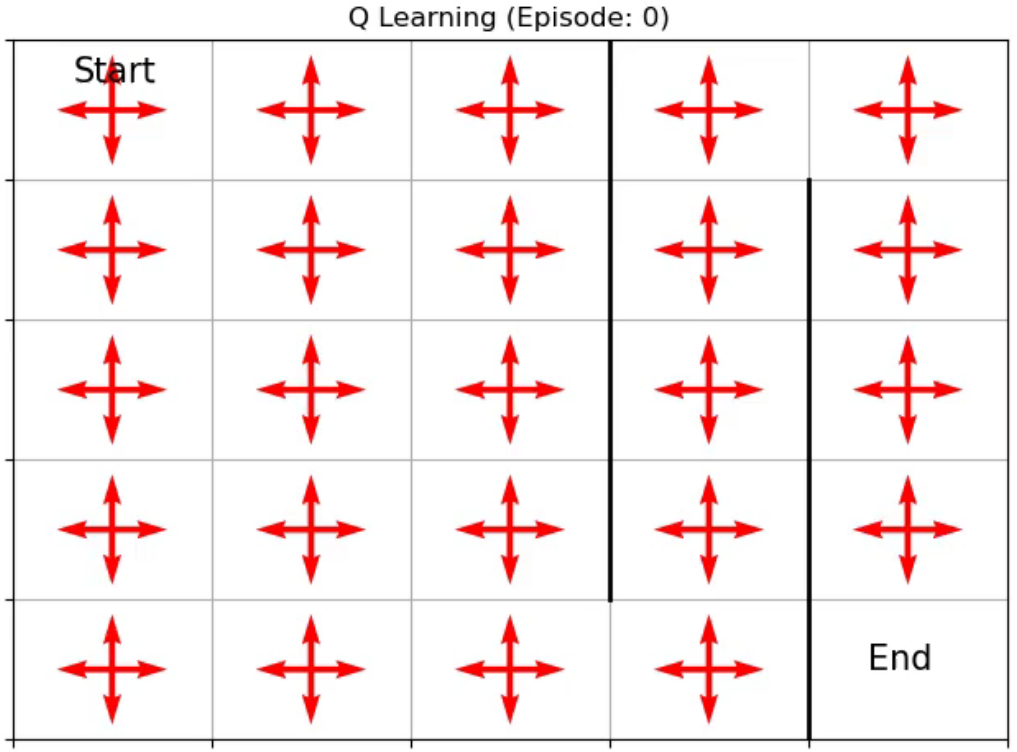
- Example: Finding clusters in customer data using K means algorithm

# Reinforcement Learning: Example

- Example: Find strategy to go through maze as quickly as possible using Q – Learning algorithm



# Machine Learning: Learning Algorithms

- Learning Algorithms employ iterative approaches
  - Make an initial guess for solution (such as function, cluster, strategy) and then attempt to improve guess
- Systematic approach for improving guess
  - Learning algorithms based on mathematical foundations
  - Will give overview of algorithms in next sections

# What is in this Course?

This short course contains:

- A mostly (non-technical) overview of machine learning algorithms and the problems they are used to solve with examples using pictures, plots, and animations
- Demos of machine learning code in Python
- A list of resources for further study of machine learning

# Course Resources

Located at Github Site:

https://github.com/satishchandrareddy/WhatisML

Folders:

- Code:
  - Contains sample codes in Python
- Presentations:
  - pdf versions of powerpoint presentations
- Resources:
  - pdf file with list of machine learning resources

# Course Outline

Chapter 1: Introduction

Chapter 2: Supervised Machine Learning

Chapter 3: Unsupervised Machine Learning

Chapter 4: Reinforcement Learning

Chapter 5: Useful Resources and Concluding Remarks

Chapter 6: Demo of Python Codes