Machine Learning

On AWS Academy

Contents

What is Machine Learning?

Machine Learning

- One of the applications of artificial intelligence.
- Makes the machine to learn things from trial and error methods.
- Also makes machines understand its mistake by itself.

Easily identifies trends and patterns

No human intervention needed (automation)

Continuous Improvement

How ML works..

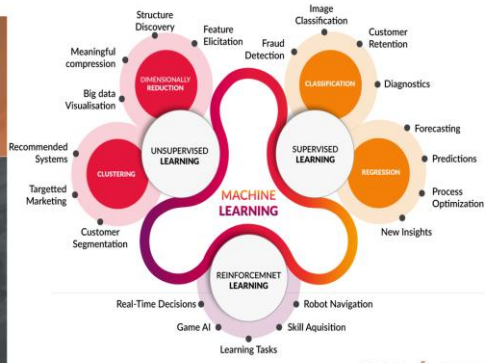
7 steps of Machine Learning

1. Gathering Data
2. Preparing that data
3. Choosing a model
4. Training
5. Evaluation
6. Hyperparameter Tuning
7. Prediction

Types of ML

3 major types of Learning Algorithm

- supervised Learning
- Unsupervised Learning
- Reinforcement Learning

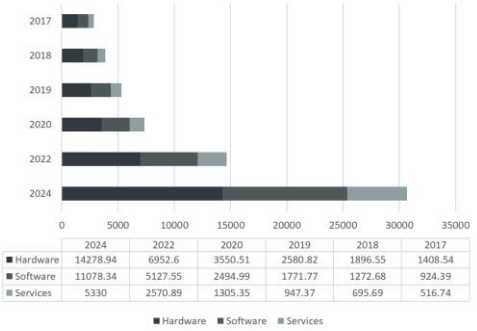


Types of ML

Supervised Learning	Unsupervised Learning	Reinforcement Learning
✓ To make predictions	✓ No labels are associated with data points.	✓ We use these algorithms to choose an action.
✓ Searches for patterns within the value labels that was assigned to data points.	✓ Organize the data into a group of clusters.	✓ It is based on each data point.
	✓ Makes complex data look simple and organized for analysis.	✓ After some time the algorithm changes its strategy to learn better and achieves the best reward.

Applications

ML on basis of Hardware , Software and Service

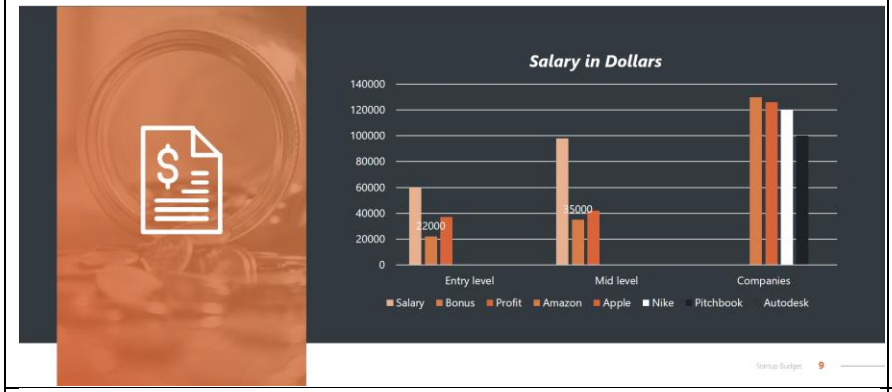


	2024	2022	2020	2019	2018	2017
Hardware	14278.94	6952.6	3550.51	2580.82	1896.55	1408.54
Software	11078.34	5127.55	2494.99	1771.77	1272.68	924.39
Services	5330	2570.89	1305.35	947.37	695.69	516.74

ML is a mix between hardware and open source software

- Though most of the machine learning is about "algorithms" to which "learn" about the data presented to it and produce some results of queries based on its learning.
- These algorithms are implemented as software which has to run over some hardware.

Salary for ML Engineer



Syllabus for ML on AWS

Course Objectives

Upon completion of this course, students will be able to:

- Describe machine learning (ML)
- Implement a machine learning pipeline using Amazon SageMaker
- Use managed Amazon ML services for forecasting
- Use managed Amazon ML services for computer vision
- Use managed Amazon ML services for natural language processing

Duration

Approximately 20 hours when delivered synchronously by an educator.

Intended Audience

This introductory course is intended for students at AWS Academy member institutions interested in pursuing a career in data science, ML, and AI.

Student Prerequisites

To ensure success in this course, students should have:

- General IT technical knowledge
- General IT business knowledge
- Experience scripting with Python or equivalent
- A basic understanding of statistics

Delivery Methods

This course can be delivered in person with synchronous lectures or with digital training modules that students can complete independently, or a combination of in-person and digital instruction (flipped-classroom model).

Syllabus for ML on AWS

Module Objectives

Module Title	Learning Objectives
Module 1: Welcome to AWS Academy Machine Learning Foundations	• Identify course prerequisites and objectives • Describe the various roles that require machine learning knowledge • Identify resources for further learning
Module 2: Introducing Machine Learning	• Recognize how machine learning and deep learning are part of artificial intelligence • Describe artificial intelligence and machine learning terminology • Identify how machine learning can be used to solve a business problem • Describe the machine learning process • List the tools available to data scientists • Identify when to use machine learning instead of traditional software development methods
Module 3: Implementing a Machine Learning pipeline with Amazon SageMaker	• Formulate a problem from a business request • Obtain and secure data for machine learning (ML) • Build a Jupyter Notebook using Amazon SageMaker • Outline the process for evaluating data • Explain why data needs to be preprocessed • Use open source tools to examine and preprocess data • Use Amazon SageMaker to train and host an ML model • Use cross-validation to test the performance of an ML model • Use a hosted model for inference • Create an Amazon SageMaker hyperparameter tuning job to optimize a model's effectiveness
Module 4: Introducing Forecasting	• Describe the business problems solved by using Amazon Forecast • Describe the challenges of working with time series data • List the steps that are required to create a forecast by using Amazon Forecast • Use Amazon Forecast to make a prediction
Module 5: Introducing Computer Vision	• Describe the computer vision use cases • Describe the AWS managed machine learning (ML) services for image and video analysis • List the steps required to prepare a custom dataset for object detection • Describe how Amazon SageMaker Ground Truth can be used to prepare a custom dataset • Use Amazon Rekognition to perform facial detection
Module 6: Introducing Natural Language Processing	• Describe the natural language processing (NLP) use cases that are solved by using managed Amazon ML services • Describe the managed Amazon ML services available for NLP • Use managed Amazon ML Services
Module 7: Course Wrap-Up	• N/A

Syllabus for ML on AWS

Course Contents

		# Slides/ Lecture & Demo Duration	Lab Duration	Total Duration
Module 1 – Welcome to AWS Academy Machine Learning Foundations		**21/30 min.**		**30 min.**
Lecture or Video	Course prerequisites and objectives			
Lecture or Video	Machine learning job roles			
Lecture or Video	Resources, documentation, and whitepapers			
Module 2 – Introducing Machine Learning		**48/120 min.**		**120 min.**
Lecture or Video	What is Machine Learning?			
Lecture or Video	Business problems solved with Machine Learning			
Lecture or Video	Machine Learning process			
Lecture or Video	Machine Learning tools overview			
Lecture or Video	Machine Learning challenges			
Demo	Demonstration: Introducing Amazon SageMaker	10 min.		
Knowledge Check	Machine Learning Concepts	10 min.		
Module 3 – Implementing a Machine Learning pipeline with Amazon SageMaker		**132/230 min.**	**200 min.**	**430 min.**
Lecture or Video	Scenario introduction			
Lecture or Video	Collecting and securing data			
Guided Lab	Exploring Amazon SageMaker		30 min.	
Lecture or Video	Evaluating your data			
Guided Lab	Visualizing Data		30 min.	
Lecture or Video	Feature engineering			
Guided Lab	Encoding Categorical Variables		30 min.	
Lecture or Video	Training			
Demo	Demonstration: Training a Model Using Amazon SageMaker	10 min.		
Guided Lab	Splitting Data and Training a Model using XGBoost		30 min.	
Lecture or Video	Hosting and using the model			
Guided Lab	Hosting and Consuming a Model on AWS		20 min.	

Syllabus for ML on AWS

		# Slides/ Lecture & Demo Duration	Lab Duration	Total Duration
Lecture or Video	Evaluating the accuracy of the model			
Guided Lab	Evaluating Model Accuracy		30 min.	
Lecture or Video	Hyperparameter and model tuning			
Demo	Demonstration: Optimizing Amazon SageMaker Hyperparameters	10 min.		
Demo	Demonstration: Running Amazon SageMaker Autopilot	10 min.		
Guided Lab	Tuning with Amazon SageMaker		30 min.	
Knowledge Check	Machine Learning pipeline implementation	10 min.		
Challenge Lab 1 Class Project – Select and Train an algorithm			**300 min.**	**300 min.**
Module 4 – Introducing Forecasting		**38/60 min.**	**60 min.**	**120 min.**
Lecture or Video	Forecasting overview			
Lecture or Video	Processing time series data			
Lecture or Video	Using Amazon Forecast			
Demo	Demonstration: Creating a Forecast with Amazon Forecast	10 min.		
Guided Lab	Creating a Forecast with Amazon Forecast		60 min.	
Knowledge Check	Managed Services for Forecasting	10 min.		
Module 5 – Introducing Computer Vision (CV)		**56/60 min.**	**60 min.**	**120 min.**
Lecture or Video	Introducing Computer Vision			
Lecture or Video	Analyzing image and video			
Demo	Demonstration: Introducing Amazon Rekognition	10 min.		
Lecture or Video	Preparing custom datasets for computer vision			
Demo	Demonstration: Labeling images with Amazon Ground Truth	10 min.		
Guided Lab	Facial Recognition		60 min.	
Knowledge Check	Computer Vision	10 min.		
Module 6 – Introducing Natural Language Processing		**37/ 60 min.**	**60 min.**	**120 min.**
Lecture or Video	Overview of Natural Language Processing			
Lecture or Video	Natural Language Processing managed services			
Demo	Demonstration: Introducing Amazon Polly	10 min.		
Demo	Demonstration: Introducing Amazon Comprehend	10 min.		
Demo	Demonstration: Introducing Amazon Translate	10 min.		
Guided Lab	Create a bot to schedule appointments		60 min.	
Knowledge Check	Natural Language Processing	10 min.		
Module 7 – Course Wrap-Up		**11/ 30 min.**		**30 min.**
Lecture or Video	Course summary			
Lecture or Video	AWS documentation			
Lecture or Video	AWS Certified Machine Learning - Specialty