Critical Path

Machine Learning in Cloud Computing

AIGC-5003- Winter 2023

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The Critical Path is the course schedule. It is an important document that lays out weekly **and/or** module objectives that you are responsible for to ensure academic success. Download and/or print out a copy of the Critical Path and refer to it regularly.

Module Breakdown

Module	Topics, Readings, and Activities	Due Dates	Weight
1	**Module 1:** Fundamental of AWS cloud (1) **Topics:** • What is VPC • What is EC2 • What is Lambda • What is Cloud9 • What is S3 **Readings:** • Lecture Notes **Activities:** Run and practice the solutions and codes in class	Wed. Jan 11 Thu. Jan 12 Wed. Jan 18	

Module	Topics, Readings, and Activities	Due Dates	Weight
	Assignment 1: • Create a new instance in a public subnet and Install boto3 on it • Query S3 bucket and running instances programmatically from inside of that instance		5%
2	**Module 2:** Fundamental of AWS cloud (2) **Topics:** • What is IAM • Containers and ECR • ML Pipeline • SageMaker Architecture **Readings:** • Lecture Notes **Activities:** Run and practice the solutions and codes in class **Assignment 2:** See the lecture note. You need to do mandatory assignment and select one of the optional assignments	Thu. Jan 19 Wed. Jan 25 Thu. Jan 26 Wed. Feb 01	Mandatory assignment 2.5 % optional assignment 2.5 %

Module	Topics, Readings, and Activities	Due Dates	Weight
3	**Module 3:** Introduction to AI services in AWS **Topics:** • Amazon Transcribe • Amazon Translate • Amazon Comprehend • Polly • Lex • Rekogniation • Textract **Readings:** • Lecture Notes **Activities:** Run and practice the solutions and codes in class **Assignment 3**:	Thu. Feb 02 Wed. Feb 08 Thu. Feb 09	 5%
4	**Module 4:** Using Amazon SageMaker **Topics:** • High level Introduction to Amazon SageMaker features	Wed. Feb 15 Thu. Feb 16 Wed. Feb 22	

Module	Topics, Readings, and Activities	Due Dates	Weight
	• Creating the first Jupyter Notebook in Amazon SageMaker • Using SageMaker Marketplace • Labeling data with SageMaker GroundTruth **Readings:** • Class Notes and Blackboard Notes **Activities:** Run and practice the solutions and codes in class **Assignment 4:** Creating a labling job by SageMaker GroudTruth (See the instructions in the lecture note)		5%
	Reading Week (Feb 27-March 03)		
5	**Module 5:** Feature Engineering in Amazon SageMaker **Topics:** • Using SageMaker notebook instance to analyze and visualize the data • Using SageMaker notebook instance to clean and feature engineer • Save cleaned data locally and push them to S3 • Introduction to SageMaker Data Wrangler **Readings:**	Thu. Feb 23 Wed. Mar. 08	

Module	Topics, Readings, and Activities	Due Dates	Weight
	• Class Notes and Blackboard Notes **Activities:** Run and practice the solutions and codes in class **Assignment 5:** Feature Engineering in the Jupyter Instance Using Data Wrangler to do feature engineering		5%
	Mid Term Grade Due	March 10	
6	**Module 6:** Training jobs in Amazon SageMaker **Topics:** • Using Sklearn in Amazon SageMaker Jupyter instance and train a model • Training job in the AWS Management Console usingXGBoost built-in algorithm • Training through SageMaker Training API using Linear Learner built-in Algorithm • Using SageMaker Built-in Frameworks to train a model **Readings:** • Class Notes and Blackboard Notes **Activities:** Run and practice the solutions and codes in class	Thu. Mar. 09 Wed. Mar. 15	

Module	Topics, Readings, and Activities	Due Dates	Weight
	Assignment 6: Creating a new training job in SageMaker		5%
7	**Module 7 and 8:** Inferencing in Amazon SageMaker **Topics:** • What is inferencing in SageMaker • Different types of Inferencing • Deploying a model and use it to inference **Readings:** • Class Notes and Blackboard Notes **Activities:** Run and practice the solutions and codes in class **Assignment 7:** There are 3 questions at the end of Realtime inferencing notebook. Each group should answer one of those.	Thu. Mar. 16 Wed. Mar. 22	5%
8	**Module 7 and 8:** Hyperparameter optimization **Topics:** • Searching among the hyperparameters by random search and Baysian search	Thu. Mar. 16 Wed. Mar. 22	

Module	Topics, Readings, and Activities	Due Dates	Weight
	- Using Amazon SageMaker to do hyper-parameter tuining - Selecting the best model and deploy it **Readings:** - Class Notes and Blackboard Notes **Activities:** Run and practice the solutions and codes in class **Assignment 8:** Compare Grid, Random and Baysian searches		5%
9	**Module 9:** Project **Topics:** - Using Amazon SageMaker to run a full ML pipeline **Readings:** - Lecture notes **Project :** Run an ML pipeline in Amazon SageMaker and deliver a project end to end	Thu. Mar. 23 Wed. Mar. 29	20%
10	**Module 10 and 11:** SageMaker Studio JumpStart **Topics:**	Thu. Mar. 30 Wed. Apr. 05	

Module	Topics, Readings, and Activities	Due Dates	Weight
	• What is SageMaker Studio JumpStart • Deploying a solution in Amazon SageMaker by Studio JumpStart **Readings:** • Lecture Notes **Activities:** Run and practice the solutions and codes in class **Assignment 9:** Implementing one of the SageMaker JumpStart solutions		5%
11	**Module 11 and 10:** SageMaker Canvas **Topics:** • What is SageMaker Canvas • Using SageMaker Canvas to train a model and deploy in SageMaker **Readings:** • Lecture Notes **Activities:** Run and practice the solutions and codes in class **Assignmeny 10:** Using SageMaker canvas to implement a no-code ML model	Thu. Mar. 30 Wed. Apr. 05	5%

Module	Topics, Readings, and Activities	Due Dates	Weight
12	**Module 12:** SageMaker Studio AutoPilot **Topics:** - What is AutoML - How to use SageMaker Studio Autopilot **Readings:** - Lecture Notes **Activities:** Run and practice the solutions and codes in class **Assignment 11:** Using SageMaker Studio Autopilot in production	Thu. Apr. 06 Wed. Apr. 12	5%
13	**Final Project Exam**	Thu. Apr. 13 Wed. Apr. 19 Thu. Apr. 20	**25%**

Summary of Graded Course Components

Summary	Weight
Total Assignments : 11	55%
Project : 1	20%
Final Exam	25%
Total	100%
Books/References:AWS SageMaker Documentation	