Critical Path

Machine Learning in Cloud Computing

AIGC-5003- Winter 2024

Instructor: Morteza Kiadi

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:**	Wed. Jan 10 Thu. Jan 11 Fri. Jan 12 Wed. Jan 17	

Module	Topics, Readings, and Activities	Due Dates	Weight
	Run and practice the solutions and codes in class. **Assignment 1:** • Create a new instance in a public subnet and install boto3 on that server. • Make sure the instance has the right role. • Query the S3 bucket and the running instances programmatically from inside of that instance	Thu. Jan 18 Fri. Jan 19	5%
2	**Module 2:** Fundamental of AWS cloud (2) **Topics:** • What is IAM • Containers and ECR • ML Pipeline • Amazon SageMaker Architecture **Readings:** • Lecture Notes **Activities:** Run and practice the solutions and codes in class	Wed Jan 24 Thu. Jan 25 Fri. Jan. 26	

Module	Topics, Readings, and Activities	Due Dates	Weight
	Assignment 2: See the lecture note. You need to do a mandatory assignment and select one of the optional assignments	Wed. Jan 31 Thu. Feb 01 Fri. Feb 02	Assignment (mandatory) 2.5 % Assignment (option 1 or option2) 2.5 %
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**: See the instructions in the lecture note.	Wed. Feb 07 Thu. Feb 08 Fri. Feb. 09 Wed. Feb 14 Thu. Feb 15	5%

Module	Topics, Readings, and Activities	Due Dates	Weight
4	**Module 4:** Using Amazon SageMaker **Topics:** • High level Introduction to Amazon SageMaker features • 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 labeling job by SageMaker GroudTruth (See the instructions in the lecture note)	Fri. Feb 16 Wed. Feb 21 Thu. Feb 22	5%
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	Fri. Feb 23	

Module	Topics, Readings, and Activities	Due Dates	Weight
	• Save cleaned data locally and push them to S3 • Introduction to SageMaker Data Wrangler **Readings:** • Class Notes and Blackboard Notes **Activities:** Run and practice the solutions and codes in class		
	WINTER READING WEEK (NO CLASSES)	**FEB 26 - MAR 01**	
	Assignment 5: Feature Engineering in the Jupyter Instance (2%) Using Data Wrangler to do feature engineering (3%)	Wed. Mar 06 Thu. Mar 07	5%
	MID-TERM GRADES DUE	**MAR 08**	
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 using XGBoost built-in algorithm.	Fri. Mar. 08	

Module	Topics, Readings, and Activities	Due Dates	Weight
	• 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. **Assignment 6:** Creating a new training job in SageMaker (5%)	Wed. Mar 13 Thu Mar 14	5%
	Introduction to Project 1	Fri. Mar. 15	
	Project 1	Wed Mar 20 Thu Mar 21	10%
7	**Module 7:** Inferencing in Amazon SageMaker **Topics:** • What is inferencing in SageMaker • Different types of Inferencing • Deploying a model and using it to inference	Thu. Mar. 22	

Module	Topics, Readings, and Activities	Due Dates	Weight
	Readings: • Class Notes and Blackboard Notes **Activities:** Run and practice the solutions and codes in class. **Assignment 7:** Answer the question at the end of the Real-time inferencing notebook. (2 marks). There are 2 questions at the end of the serverless inferencing notebook. (Each question has 1.5 points. Total 3 marks)	Wed. Mar. 27 Thu. Mar. 28	5%
8	**Module 8:** Hyperparameter optimization **Topics:** • Searching among the hyperparameters by random search and Bayesian search • Using Amazon SageMaker to do hyper-parameter tuning. • Selecting the best model and deploying it **Readings:** • Class Notes and Blackboard Notes **Activities:** Run and practice the solutions and codes in class. **Assignment 8:**	Fri. Mar. 29 (optional attendance)	

Module	Topics, Readings, and Activities	Due Dates	Weight
	There are two assignments mentioned in the lecture notes. You need to do one of them.	Wed. Apr 03 Thu Apr 04	5%
9	**Module 9:** Project 2 **Topics:** • Using Amazon SageMaker to run a full ML pipeline. **Readings:** • Lecture notes **Project 2:** Run a full ML pipeline project in Amazon SageMaker and deliver it. Please see the lecture note for details.	Thu. Apr. 05 Wed. Apr. 10 Thu Apr 11	25%
10	**Introduction to the final exam**	Thu. Apr. 12	
11	**Final Exam**	Wed. Apr. 17 Thu. Apr 18 Fri Apr 19	25%

Summary of Graded Course Components

Summary	Weight
Total Assignments : 11	50%
Project :	25%
Final Exam	25%
Total	100%
Books/References:AWS SageMaker Documentation	