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**Presidential Initiative for Artificial Intelligence and Computing (PIAIC)**

https://www.piaic.org

**Artificial Intelligence Specialist Program**

Course Syllabus

**Quarter IV: AI-401 Building, Training, and Deploying Machine Learning Models**

Version 2.0.0 - 2021 (13 Weeks)

**Teaching Team: Inam Ul Haq, Anees Ahmed, Nasir Hussain, Muhammad Qasim, Khurram Raheel, Waqas Ali Munawar, Muhammad Ali, Muhammad Hamza Khan, Aqsa Abdul Qadir, Fayyaz Farooq, Gulraeez Gulshan, Hafiz Muhammad Shahid, Jalees Ur Rehman Khan, Komal Aftab, Mansoor Hussain, Mohsin Iqbal, Muhammad Ali, Muhammad Asadullah, Muhammad Hamza Khan, Muhammad Haseeb Amjad, Muhammad Shahzad Ahsan, Muhammad Sohaib, Muhammad Usman, Nehal Ahmed, Ramsha Munawarah Azeemi, Saqib Arfeen, Shafqat Soomro, Shifa-ur-Rehman Jamali, Syed Hamza, Syed Hamza Ali, Syed Muhammad Masab, Syed Wajahat Ali Naqvi, Umair Shahzad, Waqas Ali Munawar, Rauf ur Rahim, Faizan Amin, Tahir Bhatti, Adan Abid, and Arslan**

**Class Duration: 3 hours**

**Course Description:**

In this course we learn to Amazon SageMaker to quickly build, train, and deploy machine learning (ML) models at scale, without managing any infrastructure. SageMaker helps you focus on the ML problem at hand and deploy high-quality models by removing the heavy lifting typically involved in each step of the ML process. This course is a comprehensive guide for data scientists and ML developers who want to learn SageMaker.

In the second half of the course we will focus on learning how to build high performance systems for object detection, segmentation, and video processing using TensorFlow, which is built into SageMaker. You’ll learn the techniques and tools that will cut deployment time from days to minutes, so that you can focus on developing new models.

**Please bring a Laptop with you for the Classes (Required, but not mandatory)**

**Textbook:**

1. Learn Amazon SageMaker: A guide to building, training, and deploying machine learning models for developers and data scientists by Julien Simon

<https://www.amazon.com/Learn-Amazon-SageMaker-developers-scientists/dp/180020891X/ref=sr_1_1>

1. Hands-On Computer Vision with TensorFlow 2: Leverage deep learning to create powerful image processing apps with TensorFlow 2.0 and Keras by Benjamin Planche, Eliot Andres

<https://www.packtpub.com/application-development/hands-computer-vision-tensorflow-2>

Book Repo: <https://github.com/PacktPublishing/Hands-On-Computer-Vision-with-TensorFlow-2>

**Get AWS Cloud Free Tier:**

<https://aws.amazon.com/free/>

**PIAIC Announcements Facebook Group:** <https://www.facebook.com/groups/piaic/>

**Course Facebook Group:** <https://www.facebook.com/groups/deep.learning.edu/>

**Portal for online and onsite students:**

<https://portal.piaic.org/>

**Chat on Discord:**

<https://discord.gg/PwHUZA3M4Y>

**Grading:**

Students will be graded based on Percentile

<https://en.wikipedia.org/wiki/Percentile>

<https://en.wikipedia.org/wiki/Percentile_rank>

A-Grade: 78- 99 Percentile

B-Grade: 41- 77 Percentile

C-Grade: 23- 40 Percentile

D-Grade: 1 - 22 Percentile

F-Grade: Anyone who doesn’t appear in two or more exams

Note: Anyone who receives a F-Grade will be removed from the program. Students who receive a D-Grade will be put on probation, and be required to earn a grade of C or above in the next quarter, to remain in the program. Anyone absent from an exam will be deemed to have received a score of zero.

**Course Outline:**

1. Introduction to Amazon SageMaker (Week 1)

Chapter 1 of Learn Amazon SageMaker

1. Handling Data Preparation Techniques in the Cloud (Week 2)

Chapter 2 of Learn Amazon SageMaker

1. AutoML with Amazon SageMaker Autopilot (Week 3)

Chapter 3 of Learn Amazon SageMaker

1. Training Machine Learning Models (Week 4)

Chapter 4 of Learn Amazon SageMaker

1. Training Natural Language Processing Models (Week 5)

Chapter 6 of Learn Amazon SageMaker

1. Training Computer Vision Models (Week 6)

Chapter 5 of Learn Amazon SageMaker

1. Extending Machine Learning Services Using Built-In TensorFlow Framework (Week 7)

Chapter 7 Pages 216-238 of Learn Amazon SageMaker

1. Object Detection Models using TensorFlow and SageMaker (Week 8)

Chapter 5 of Hands-On Computer Vision with TensorFlow 2

1. Enhancing and Segmenting Images using TensorFlow and SageMaker (Week 9)

Chapter 6 of Hands-On Computer Vision with TensorFlow 2

1. Training on Complex and Scarce Datasets using TensorFlow and SageMaker (Week 10)

Chapter 7 of Hands-On Computer Vision with TensorFlow 2

1. Video and Recurrent Neural Networks using TensorFlow and SageMaker (Week 10)

Chapter 8 of Hands-On Computer Vision with TensorFlow 2

1. Scaling Your Training Jobs in the Cloud (Week 11)

Chapter 9 of Learn Amazon SageMaker

1. Deploying Machine Learning Models (Week 12)

Chapter 11 of Learn Amazon SageMaker

1. Automating Machine Learning Workflows using CDK and AWS Step Functions (Week 13)

Chapter 12 Pages 414-435 of Learn Amazon SageMaker