Presidential Initiative for Artificial Intelligence and Computing (PIAIC)

https://www.piaic.org

Artificial Intelligence Specialist Program

Course Syllabus

Quarter III: AI-301 Deep Learning in Practice and Microservices in Python

Version 1.0.0 - 2020 (12 Weeks)

Teaching Team: Inam Ul Haq, Dr. Noman Islam, 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: 4 hours

Course Description: We will start this course by learning fundamentals of Linux and Docker on the student portal. In the class we will start by focusing on deep learning for computer vision, text and sequences. Then advanced deep-learning best practices and generative deep learning will be reviewed. The students will then learn how to develop microservices in Python and deploy them on Kubernetes clusters. At the end of the course we will learn how to manage containers and machine learning infrastructure in the cloud using Kubernetes and Kubeflow.

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

Textbooks:
1. Deep Learning with Python by Francois Chollet
2. Flask Web Development Second Edition by Miguel Grinberg
3. Kubeflow Operations Guide by Austin Harris, Michael Katzenellenbogen, Josh Patterson
4. Linux: Easy Linux for Beginners by Felix Alvaro
5. Docker Deep Dive by Nigel Poulton
6. Kubernetes in Action by Marko Lukša

References:
1. https://www.tensorflow.org/
2. Hands-on Machine Learning with Scikit-Learn, Keras, and TensorFlow, 2nd Edition by Aurélien Géron

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/

Ask Questions:
https://ask.piaic.org/

Chat on Telegram:
Group Name: PIAIC-AI
https://t.me/piaic_ai

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.

Important Note:
If a PIAIC candidate doesn't appear in a Quiz at the scheduled time announced by management 10% score will be deducted from the test score for every week of delay.

Course Outline:

1. **Linux for Beginners**
   (Videos and reading material available on Student Portal to prepare for Linux Quiz, Linux will not be covered in class to save class time)
   Chapters 1, 2, 4, 5, 7, 8, and 9 from Linux: Easy Linux for Beginners by Felix Alvaro

   We will use Ubuntu:
   https://tutorials.ubuntu.com/tutorial/tutorial-ubuntu-on-windows#0
   or
   https://www.lifewire.com/run-ubuntu-within-windows-virtualbox-2202098

   Linux for Beginners Quiz in Week 2
   Total Questions: 32, Total Time: 40 minutes

2. **Docker Deep Dive**
   (Videos and reading material available on Student Portal to prepare for Docker Quiz, Docker will not be covered in class to save class time)

   Chapters 1 to 8 of Docker Deep Dive book by Nigel Poulton
   You will also need to learn the mounting of host directories in the containers. To learn how to mount local directory with -v flag read from here:
   https://docs.docker.com/engine/admin/volumes/bind-mounts/#choosing-the--v-or-mount-flag

   Homework Videos:
   https://www.youtube.com/watch?v=EnJ7qX9fkcU
   https://www.youtube.com/watch?v=cCTLjAdIQho
   https://www.youtube.com/watch?v=76rX4s73MrM

Docker Quiz in Week 4
Total Questions: 25, Total Time: 40 min

3. **Deep Learning in Practice Part 1** (Weeks 1 and 2)
Chapter 5 of Deep Learning with Python by Francois Chollet

4. **Deep Learning in Practice Part 2** (Weeks 3 and 4)
Chapter 6 of Deep Learning with Python by Francois Chollet

5. **Deep Learning in Practice Part 3** (Weeks 5)
Chapter 7 of Deep Learning with Python by Francois Chollet

6. **Deep Learning in Practice Part 4** (Weeks 6)
Chapter 8 of Deep Learning with Python by Francois Chollet

   Deep Learning in Practice Quiz in Week 7
   Total Questions: 55, Total Time: 75 minutes

7. **Microservices in Python** (Weeks 7 - 9)

   https://towardsdatascience.com/microservice-architecture-a-brief-overview-and-why-you-should-use-it-in-your-next-project-a17b6e19adfd

   Chapter 1, 2, 4, and 5 from Flask Web Development Second Edition

   Microservices in Python Quiz in Week 10
   Total Questions: 30, Total Time: 45 minutes

8. **Introduction to Kubernetes** (Weeks 10 and 11)
Chapter 2 and 3 of Kubernetes in Action Book
Appendix A: Using kubectl with multiple clusters from Kubernetes in Action

9. **Introduction to Kubeflow** (Week 12 - 13)
Chapter 1 of Kubeflow Operations Guide Book

   Kubernetes and Kubeflow Quiz in Week 14
   Total Questions: 50, Total Time: 75 minutes

The speed of the class will depend on how much students are able to absorb the material. If some material is left after the end of the third quarter it will be taught in the fourth quarter but the sequence will remain exactly as above.