Senior Design Project Description

Company Name	*Internal ECE Dept.*	Date Submitted	*October 16, 2018*
Project Title	*Deep Learning as a Cloud Service* **(UNCC_CLOUD)**	Planned Semester	*Spring 2018*

Personnel

We expect 250 hours per person with three to 4 students based on the project scope:

Discipline	Number	Discipline	Number
Mechanical		Electrical	
Computer	3	Systems	
Other ( )			

Project Overview:

Cloud computing and Deep Learning are two rapidly emerging fields within computing. Cloud computing refers to the use of remote machines to deliver a combination of infrastructure, platform, or a software as a service. Depending on their needs, user are able to almost instantly access computing capability from public cloud providers such as Amazon, Google, Microsoft and others. With the increasing movement of software services moving to the cloud, there is a great demand for cloud computing skills among graduate computer engineering students. Meanwhile, recent years have witnessed unprecedented success of Deep Learning, an AI technology, in areas such as computer vision, autonomous driving, text analytics, and natural language processing. Deep Learning requires large compute power, and ability to store and access large volumes of data. Both of these requirements makes cloud computing a great platform for Deep Learning. The goal of the senior design project is to make students proficient in these two technologies, through a yearlong project.

The aim of the project is for students to develop a Deep Learning service in the cloud that a user can access through a laptop or mobile device. In the Phase-I of the project, the students will develop a Deep Learning application such as object detection in images. The students will then implement this as a web service on the AWS cloud. Further the students will be exposed to modern cloud native development techniques such as microservice architecture, and continuous integration/deployment (CI/CD). In Phase-II of the project, the students will implement a novel deep learning service of their own design using the skills learned Phase-I of the project. The ultimate goal of the Phase-II is to develop a start-up worth Minimum Viable Product (MVP)!

The project will expose students to a number of computing technologies such as Python programming language, PyTorch Deep Learning framework, NumPy and Pandas data processing

libraries, web server development, Kubernetes, Docker, and AWS. Students will also have an opportunity to develop mobile applications for their service (Java for Android, and Swift for iOS).

Initial Project Requirements:

The students will work on student owned laptops, and Amazon Web Services (AWS) services subscribed to by UNC Charlotte. GPUs, and mobile devices will be provided from my lab.

Expected Deliverables/Results:

The students will deliver a working Deep Learning based cloud service accessible to users from the laptop and/or mobile devices. The students should be able to live demo the project at the senior design expo. The major deliverable is a Deep Learning Cloud Service which users can access through desktop and/or mobile device. The type of service is a design idea that the team should come up with at start of Phase-II of the project.

Disposition of Deliverables at the End of the Project:

All code developed as a part of the project will be open sourced under appropriate license such as BSD.

List here any specific skills, requirements, knowledge needed or suggested (If none please state none):

Students should have taken ECGR 2104 and ECGR 3101 with B or better. ECGR 3090 (Data structures and algorithms) is encouraged but not required. Students should have a passion for programming, and be highly motivated to self-learn cutting edge technologies.