Project Title: Handwritten Character Recognition using Deep Learning

Project Supervisor: Dr. Abubakar M. Ashir

Synopses:

Deep learning is a specialized form of a machine learning that provides a more in-depth approach to how machines are train to mimic human reasoning. Applications of these artificial intelligence algorithms are gradually taking over our communication and internet-based spaces. They provided enormous help in in the field of robotics, data mining, character recognition, language translation, predictions and decision making by machines. The project applies the knowledge of artificial intelligence to create a deep learning model algorithm that is trained with MNIST database of handwritten character. The trained model will be tested by being supplied with handwritten characters it has not seen before. It is expected to predict the handwritten character based on its previous knowledge. Standard training and cross-validation approaches will be adhered to, for system performance evaluations. PYTHON or MATLAB programming languages will be used to read, train and test the deep learning algorithm to be created.

Expected Student Background:

- • Basic of PYTHON or MATLAB programming
- • Artificial Intelligence Course.
- • Basic of Image acquisition skills.
- • Basic knowledge of Deep Learning Algorithms

Project Requirements:

- • Install and Prepare PYTHON or MATLAB IDE editor.
- • Download and preparation of MNIST Handwritten digits database.
- • Modelling of Deep Learning Algorithm.
- • Generating the model codes
- • Training of Deep Learning Model with MNIST Database
- • Test and Evaluation of the built model

Important:

Database MNIST to be used will be provided by the supervisor. If MATLAB is chosen as the platform, licensing will be the responsibility of the students. While PYTHON is open-source and does not require licensing. Adequate support will be provided to the participants by the supervisor.

What will you learn?

- Learn advanced programming skills using PYTHON and MATLAB.

- Learn working with large database

- Modelling of Deep Learning algorithm

- Training of DL Algorithm

- Testing and Evaluation of an algorithm

Project Title: Web-based Localized Weather Observatory

Project Supervisor: Dr. Abubakar M. Ashir

Synopses:

A Localized Weather observatory is a small metrological station that collects weather information (temperature, humidity, wind etc.) of the immediate environment. It provides a real-time weather information and forecast of the local environment. The system provides more accurate feeds and forecast since the observatory responsible for collecting information and forecasting is dedicated and situated in the same environment. Public are regularly updated with a secured and reliable forecast about their locality via web interface which help them make right decisions concerning weather situation that affects their lives. In the project a small weather observatory equipped with temperature, wind and humidity sensors will be built in an open protected space to be provided in the vicinity of the university. The sensors information will be collected using ESP8266 Wi-Fi Module which serve both as Data Acquisition System and web-server interface. Using the Wi-Fi wireless network, AJAX and HTTP protocols, the information is relayed to a remote server (in the department building) where it can be logged into SQL databases for subsequence use. The SQL database will serve as databank where the webserver fetches weather information and also uses that information to make the forecasting which are provided to users in the web interface.

Expected Student Background:

- Basic Web Application skills.
- Knowledge of SQL.
- Basic Arduino-like programing skills.
- Basic of embedded system design
- Local Area Network Basics

Project Requirements:

- Built a weather observatory.
- Installation and integration of sensors and with ESP8266 Wi-Fi module.
- Design and configuration of LAN between the Observatory and SQL server.
- ESP8266 Wi-Fi programming using Arduino IDE
- Design of Web GUI
- Data logging into SQL and management

- Web hosting

- Web-server updating using AJAX

- Weather forecasting computation using JAVASCRIPT

Important:

Most of the materials needed to be use in the observatory are quite inexpensive and are expected to be provided by the student. However, for a much bigger observatory school may be requested to cover the cost of the projects. A computer to be used as a server for hosting both SQL and Web-server is also expected to be provided by the school. Wi-fi signal booster may also be required depending on the distance between the observatory and the server. Participants will get adequate help from the project supervisor on implementation at any stage in the project.

What will you learn?

The project provides a sound platform to build a system from ground up.

- It equips participant knowledge of physical system design and installation.

- Data acquisition and from the real system using Arduino IDE platform

- How to configure Local Area Network for data relaying to remote servers

- Development of Web GUI

- Hosting of a Web-Server

- SQL data logging and queries

- Web page update using AJAX

- Learn server-side scripting and JAVASCRIPT

Project Title: Recognition of basic commands in Kurdish

Project Supervisor: Asst. Lecturer Mohammed Abdulghani

Synopses:

Kurdish Speech Recognition will be the first dataset and application to recognize basic kurdish commands. This Project helps software and hardware applications to recognize kurdish commands. Beside, researchers will be able to use a Kurdish resource for their works.

This project shows how to train a deep learning model that detects the presence of speech commands in audio in Kurdish. The project uses Kurdish Speech Commands to train a convolutional neural network to recognize a given set of commands.

- *First Kurdish dataset for audio.*
- *New software can use Kurdish command.*
- *Help researchers to improve their works on a Kurdish dataset.*

Expected Student Background:

- Intermediate Programming Skills
- Knowledge about Matlab or Python

Project Requirements:

- Setup and install Matlab.
- A simple website to establish the dataset.

What will you learn?

It will be a good chance to learn deep learning concepts using matlab. After this project you will have a good base for your future academic life. It will be a good chance to learn a convolutional neural network that will help you in your future work especially if you want to continue your academic career.

Project Title: Recognition of Kurdish Handwriting

Project Supervisor: Asst. Lecturer Mohammed Abdulghani

Synopses:

This Project will help software and applications to recognize kurdish handwriting. A dataset will be created which contains the most used kurdish words. Researchers will be able to use dataset for more advanced work.

This project shows how to train a deep learning model that detects the presence of handwritings in Kurdish. The project will use the dataset to train a convolutional neural network to recognize handwritings.

- *New software can use Kurdish handwriting Dataset.*
- *Help researchers to improve their works on a Kurdish dataset.*

Expected Student Background:
- Intermediate Programming Skills
- Knowledge about Matlab or Python

Project Requirements:
- Setup and install Matlab.
- A simple website to establish the dataset.

What will you learn?

It will be a good chance to learn deep learning concepts using matlab. After this project you will have a good base for your future academic life. It will be a good chance to learn a convolutional neural network that will help you in your future work especially if you want to continue your academic career.

Project Title: Sport Social Media

Project Supervisor: Dr. Mohamad Aldabagh

Synopses:

Sports social media is an environment for athletes to contact with each other's. This social media allows the athletes to share their hobbies and interests among each other's. Some games require to prepare team to play that game such as football or basketball and many others, sometimes collecting enough players to complete the team have not easy, especially if many of your friends have not interested to play some kinds of game. The aim of this sport social media is helping you to create a team from athletes who interest to play with you in certain time and place. In addition, this sport social media allows owners of courts to advertise available time to booking the court for athletes. This project includes the following:

- Building Social media via interactive website which allow the athletes to interact among each other's.
- Building Android Mobile Application for sport social media.

Expected Student Background:

- Good programming background is recommended.
- Advanced knowledge of building a website
- Basic Android Apps development skills.

Project Requirements:

- A computer to sketch the design of website, and to develop the system.
- Setup and install Android Studio.
- Upload the system on the internet to test it in Erbil.

What will you learn?

This project will help you to build system via website which can handle some issues in our society and make our life much easy. Development of sport social media requires simplicity and great design to be friendly to the users. The design of website involves using various tools such as CSS, JS and others. This project will also teach you to build an Android mobile application for this social media to allow the users to use it via their mobile devices.

Project Title: Productivity Android Application

Project Supervisor: Dr. Mohamad Aldabagh

Synopses:

The reason smartphones exist is so we can be more productive. The Productivity App is an android mobile application to build a routine of positive, life changing habits. The application helps to set personal goals, track goal's progress, and motivate the user to new heights. The application can help you with planning your schedule to new habits and tracking the time that spend for each habit. This project includes the following:

- Using Android material design to design nice UI, which can be easy to use by users.
- Create android database for user's habits.
- Programming skills to visualize the data to graph.

Expected Student Background:

- GOOD programming background is recommended.
- OOP programming skills is also recommended
- Knowledge of Firebase and/or SQLite.
- Knowledge of android material design tools
- Basic Android Apps development skills.

Project Requirements:

- A computer to install Android Studio Software.
- An android mobile device is recommended to test and implement the application.
- Design of UI by using XML.
- Skills to create android database and visualize the data

What will you learn?

This is a great chance to learn how you can develop an android application which can increase our productivity and make our life much easy. Development of Android Apps that involves many activities such as design friendly UI with using material design tools, android database, and using OOP programming skills to complete the App. This is your chance to practically research, design and implement an mobile application based on requirements.

Project Title: Grocery Delivery

Project Supervisor: Muhammed Anwar

Synopses:

Your grocery delivery sells a large variety of products at multiple stores. Not all products are at all stores. Pricing may be different at different stores. Each store has its own inventory of products and needs to decide when to reorder and in what quantity. Your retailer has a Web site that accepts orders. From a database perspective it is just a special store that has no physical location and has no anonymous customers. The database tracks inventory at each store, customer purchases (by market basket and by customer, where possible), sales history by store, etc. Various user interfaces and applications access the database to record sales, initiate reorders, process new orders that arrive etc.

Expected Student Background:
- Basic Skills of Programming
- Knowledge of SQL
- Basic Skills of CSS and JavaScript

Project Requirements:
- PHP
- SQL
- CSS
- JavaScript

Important:

The required components to develop such system must be provided by the students. Most of the tools needed to develop such system available online for free. However, any additional costs needed to purchase the software tools must be provided by the students. The university **might** cover the expenses for such purchase.

What will you learn?

The goal of this project is to provide a realistic experience in the conceptual design, logical design, implementation, operation, and maintenance of a relational database and associated applications.

Project Title: Real-Estate Web based Application

Project Supervisor: Muhammed Anwar

Synopses:

The application consists of the operations of a real-estate Application. The Application needs to keep track of agents, buyers, sellers, properties on the market, and recently sold properties. This office focuses on homes and business real estate. The management of this real-estate application is not very computer literate. You are being asked to design the database, populate it with sample data and web based Application .

Expected Student Background:

- Basic Skills of Programming
- Knowledge of SQL
- Basic Skills of CSS and JavaScript

Project Requirements:

- PHP
- SQL
- CSS
- JavaScript

Important:

The required components to develop such system must be provided by the students. Most of the tools needed to develop such system available online for free. However, any additional costs needed to purchase the software tools must be provided by the students. The university **might** cover the expenses for such purchase.

What will you learn?

The goal of the project is providing realistic experience in the conceptual design, logical design, implementation, operation, and maintenance of a relational database and associated applications.

Project Title: An Intelligent Street Parking System with Double Authentication Procedure

Project Supervisor: Dr. Saman Mirza Abdullah

Synopses:

Street parking system still not available in Kurdistan. There is a very unsystematic parking process on streets in Kurdistan, especially, in the large cities such as Erbil. Cars are left for a very long time, sometimes morning to evening, on street that increases the traffic load. There is a necessary to develop a street parking system for making cars not stop on street for a long time and when stop there should be some payments for that. An intelligent street parking system can read the cars' plate and recode the number of the plat in a system with mentioning the parking duration. Some types of authentication are very necessary to (1) prove that the car is physically at that location (2) ensure that the owner of the car knows about this parking. One of the limitation of this system is about the payment, which is difficult in some countries, like Kurdistan, bacuse banking systems still not available.

Expected Student Background:
- Basic knowledge on website development.
- Knowledge on image processing (Matlab is preferred)

Project Requirements:
- Setup and install Matlab.
- Tools that necessary for website designing.

Important:

The required components to develop such system must be provided by the students. Most of the tools needed to develop such system available online for free. However, any additional costs needed to purchase the software tools must be provided by the students. The university **might** cover the expenses for such purchase.

What will you learn?

This project supports students to develop a type of website that works intelligent. It means, the student will learn some concept of machine learning and how to design it through Matlab and how to interconnect it with website.

Project Title: An Intelligent System for Predicting Student Grade

Project Supervisor: Dr. Saman Mirza Abdullah

Synopses:

It is, somehow, easy for students to check the difficulties of the next class subjects. However, it is not easy to predict their grades for that level, if everything is going as went for the previous year. In reality, teachers and instructors will give some tips and advises to students on their progresses. Sometimes, advises could not be understood well by students or students can't imagen in which bad situation they are if some figures or predicts not shown to students. Therefore, as a part of smart education systems, it is very necessary to show students some predictions on the next stage grads so that advises could be more understandable for them, weaknesses could be well identified, problems could be more measurable. This project proposes an intelligent system that considered the past history of a student and can predict next stage grads. The project will make compression between two intelligent based tool that common in the field of data mining and artificial intelligent.

Expected Student Background:

- Basic knowledge on data mining.
- Knowledge on image processing (Matlab is preferred)

Project Requirements:

- Setup and install Matlab.
- Collecting historical data on students' grads.

Important:

The required components to develop such system must be provided by the students. Most of the tools needed to develop such system available online for free. However, any additional costs needed to purchase the software tools must be provided by the students. The university **might** cover the expenses for such purchase.

What will you learn?

This project supports students to learn deep concept of machine learning and how to use these concepts on designing a prediction model using Matlab.

Project Title: Automated Vertical Car Parking

Project Supervisor: Dr. Goran Abdulrahman

Synopses:

Automated vertical car parking offers solutions to the challenge of limited parking space. The other advantages are saving fuel and time in searching for parking area, reduce accident and scratching, and more secure.

Expected Student Background:

- The basic of Arduino
- Programming language for example c-language

Project Requirements:

- Hardware: Arduino Mega, motors (at least 2), conveyor, gears, mechanical structure of vertical car parking and some sensors for example ultrasonic.

Important:

The required hardware must be provided by the students. Most of the pieces needed to design vertical car parking are available online and/or markets. However, any additional costs needed to purchase the hardware must be provided by the students. The university **might** cover the expenses for such purchase.

What will you learn?

The students will learn the interaction between hardware and software, and how automation controls the operation of the system.