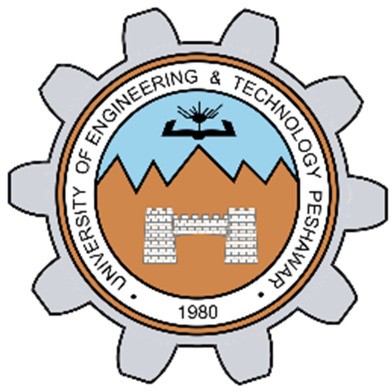
**Object Programming Essentials 3**

## LAB # 03



**Fall 2020**

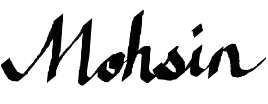
**CSE208L Object Oriented Programming Lab**

Submitted by: **Syed Mohsin Shah**

Registration No. : **19PWCSE1749**

Class Section: **A**

“On my honor, as student of University of Engineering and Technology, I have neither given nor received unauthorized assistance on this academic work.”



Student Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Submitted to:

## **Engr. Sumayyea Salahuddin**

December 25, 2020

Department of Computer Systems Engineering University of Engineering and Technology, Peshawar

# **Objectives of the Lab:**

* Understand how class object can be passed and returned from class member function
* Write a class with member function having objects as arguments
* Write a class with member function that return object
* Test member function effectively using given test cases

**Activity 3.3.2**

**Title:**

# Make a group consisting of 2‐3 students and submit OOP Lab Project Proposal including:

# Project Group Members (Names and Registration Numbers)

# **Project Group Members:**

**Name:**  Syed Shaaf Ali Banoori

**Reg No:** 19PWCSE1788

**Name:** Muhammad Hammad

**Reg No:** 19PWCSE1778

**Name:** Syed Mohsin Shah

**Reg No:** 19PWCSE1749

**Activity 3.3.3**

**Title:**

# **Research Analysis**

# To inculcate the knowledge of the state‐of‐the‐art problems and initiate critical thinking process to solvethem, each student is provided with a unique research paper. Following should be submitted:

# Brief 1‐page summary of the provided research paper in your own words

# Perform online search and find another paper similar/related to provided paper and summarizeit too

# Compare both papers in one paragraph and state which idea is better and why?

Remote-sensing imagery classification using MCA-based AdaBoost

This Research focuses on getting an accurate Machine Learning Algorithm for Image Classification from a remote distance and minimize uncertainties and overfitting in the Machine Learning Algorithm. It also focuses to perform well for all land-use categories as well as enhancing classification performance of the algorithm being used. Past Research has shown that various Machine Learning methods and algorithms have been used but none of them can produce perfect classification accuracy in all categories. There the advantages of using different classification algorithms are not considered. This research suggests that Multiple Classifier System has emerged a powerful method because it solves same classification problems. It produces a number of classifiers with diversity and combines them based on their classification. This classification method is based on one learning algorithm that trains many classifiers by changing training sets and using plurality voting to combine hypothesis from the output. AdaBoost learning algorithm is used to create strong classifier based on many weak ones. This adaptability and reliability doesn’t require weak learning knowledge. It also retrains difficult to classify samples which is its biggest advantage. On the other hand AdaBoost is sensitive to noisy data and outliers, causing overfitting. Therefore an MCA AdaBoost is used. Research experiments on data from Operational Land Imager RS image from USGS. Gram-Schmidt pan sharpening method was used to enhance the images by merging high resolution panchromatic image with low spatial resolution. Rectangular region in Huizhou city was analyzed with a 9 class classification scheme (9 types of land). C4.5 decision tree, ANN and Naïve Bayes (NB) algorithms were used to train MCA AdaBoost classifiers. All algorithms boosted by AdaBoost achieved satisfactory results. On the contrary, MCA AdaBoost achieves higher entropy than that expressed by AdaBoost. Algorithms used to train the base classifiers of MCA AdaBoost should be C4.5 or NB to save time because ANN requires more time but provides good results. Classification is time consuming because it requires more time to select weighted samples for training. In conclusion, MCA AdaBoost outperforms AdaBoost and the random forest.

GAN-Assisted Two-Stream Neural Network for High-Resolution Remote Sensing Image

This Research aims to improve the capabilities of high-resolution satellite remote images. It aims to increase remote sensing accuracy and image classification. It also focuses on developing a deeper network in order to enhance feature robustness with increased extraction efficacy and to increase performance. Previous Research suggests feature extraction focuses on fusing different layers. First few layers have smaller receptive fields so results are satisfactory after fusing the layers. Multiple research were made to make improvements: CNN to extract features from multiscale images, MIFK coding to extract from corresponding layers. These only used the advantages of deep learning hierarchical features. Research proposed a new two-stream neural network to track low-level as well as high-level features at the same time, in order to enhance High Resolution remote-sensing image classification. Supervised residual network and the unsupervised SCAE network were used to extract and combine features from different levels which then also helps in end-to-end and pixel classification. Proposed two-stream neural network involves several kinds of key components, such as Residual Network and Generative Adversarial Net. Residual Network was utilized to increase performance of the deeper CNN and increase classification accuracy. The new GAN concept is used which will help to enhance feature extraction of the model and also explore most distinct feature in the Neural Network, thus making feature extraction more effective. VHR remote sensing panchromatic images always preserve a fine spatial resolution. Two Stream Method used is the Residual network structure for PAN images which is the main line and the other is an SCAE CNN supported by GAN, serving as an auxiliary part to extract features from multispectral images and to aid the main line. Proposed method was tested on images from satellites GF02 and BJ02 of the Dongying city in China and Experiment was also performed using URDNN method. Values for proposed method stayed absolute ahead, which achieved 97.9% and 97.2% accuracy which is higher than URDNN. In conclusion, method achieved superior results in terms of integrity, accuracy and effectiveness.

Comparison

GAN-Assisted Two-Stream Neural Network is a much better method for Remote Sensing Image Classification. The new GAN concept is way better than MCA AdaBoost because it generates new data based on same statistics as a training set. This method also uses Residual CNN which is far more accurate than AdaBoost’s ANN analysis. The results say that Two Stream NN is the clear winner in terms of accuracy, efficiency and effectiveness but in terms of speed the AdaBoost network might have a slight upper hand.