# Syed Muhammad Dawoud Sheraz Ali

# BESE-5-B

# 111417

**SE312: Software Construction**

# Lab 2: Development and Analysis of Matrix Multiplication Algorithms

**Date: February 22nd , 2017**

**Time: Wednesday (10:00 – 13:00), Wednesday (14:00 – 17:00)**

# Instructor: Fahad Ahmed Satti

**GitHub:** <https://github.com/SyedDawoud/University/tree/master/Software%20Construction>

**Introduction**

This lab is about the Matrix Multiplication. We all are familiar with the Matrix Multiplication. Most of us have very good practice at doing the Matrix multiplication by hand. The purpose of this lab is to introduce us to do the programmed version of Matrix Multiplication. There are many methods to do so, but for this lab, following two methods have been considered:

1. Iterative Method
2. Strassen Method

**Approach & Analysis**

Iterative method is based on traditional approach and runs in O (n3) (Considering square Matrices). The approach is that

Cmp = Amn x Bnp

Move through each row and column and do the calculation that has been done in Code. Strassen algorithm follows Divide-and-Conquer approach and runs in approx. O (n2.7). The working has been explained in the code. The Pseudo-code for the Iterative algorithm is like:

For a in range(0,m):

For b in range (0,p)

C[a][b]=0

For c in range (0,n)

C[a][b]+=A[a][c]+B[c][b]

Iterative function takes hardly 5-10 lines with no special things. However, Stressan requires special function like Add Matrices, Slice Matrices, Subtract Matrices. Also, there were at least 11 2d arrays introduces for Strassen.

**Running the Code**

The code has been written in Python. Since the file contains Algorithms and Unit tests both, so there is need to proper IDLE to run the test and output separately. I used PyCharm on my machine to run the tests and regular output. To run the code, Python and Python IDLE are the requirements.

Since there is no separate classes, it is very easy to use the Multiplication. For Iterative Function, Just pass 2 matrices and all the calculation would be done. For Strassan, the condition is that input should be **SQUARE Matrix of order 2n**. Checks haven’t been introduced.

