

## CS6777: Optimization Methods for Computer Vision Applications

### ASSIGNMENT-1

(Deadline : 15<sup>th</sup> Sept)

Write codes for testing 4 optimization methods given below,

- i. Adaptive gradient descent method (C++)
- ii. Quasi-Newton method (C++)
- iii. Conjugate gradient method (C++)
- iv. Gauss-Newton method (MATLAB)

for the following functions:

a)  $f(x, y) = (x + 2y - 7)^2 + (2x + y - 5)^2$  (Booth's function)

b)  $f(\mathbf{x}) = \sum_{i=1}^3 [100(x_{i+1} - x_i^2)^2 + (x_i - 1)^2]$  (Rosenbrock function)

c)  $f(x, y) = (1 + (x + y + 1)^2(19 - 14x + 3x^2 - 14y + 6xy + 3y^2))(30 + (2x - 3y)^2(18 - 32x + 12x^2 + 48y - 36xy + 27y^2))$   
(Goldstein-price function)

d)  $f(x, y) = -|\sin(x) \cos(y) \exp(|1 - \frac{\sqrt{x^2 + y^2}}{\pi}|)|$   
(Holder table function)

Report the time taken, the solution obtained and the number of iterations for each of the optimization methods.

Two of the four methods, may be implemented/executed in both C++ and MATLAB and results compared.

**(10 marks)**