Syllabus:Optimization Techniques

Convex Optimization: Convex sets: Affine and convex sets, Generalized inequalities, Separating and supporting hyperplanes, Convex functions: Basic properties and examples, Conjugate function, Quasiconvex functions, Logconcave and log-convex functions, Convexity with respect to generalized inequalities. Convex optimization problems: Optimization problems, Convex optimization, Linear optimization problems, Quadratic optimization problems, Geometric programming, Generalized inequality constraints, Problems with Equality Constraints, Lagrange Condition, Second-Order Conditions for Lagrange Condition, Problems with Inequality Constraints, Karush-Kuhn- Tucker Condition, Second-Order Conditions for Karush-Kuhn-Tucker Condition, Vector optimization, Multiobjective optimization, Pareto solutions.

Numerical optimization techniques: line search methods, gradient methods, Newtons method, conjugate direction methods, quasi-Newton methods.

Algorithms: Unconstrained minimization problems, Descent methods, Gradient descent method, Steepest descent method, Newtons method. Algorithms for constrained optimization, Projections, Lagrangia Algorithms, Penalty methods.

Books Recommended

1. N. S. Kambo, Mathematical Programming Techniques, East West Press, 1997.

2. R. Fletcher, Practical Methods of Optimization, 2nd Ed., John Wiley, 1987.

3. D. G. Luenberger, Linear and Nonlinear Programming, 2nd Ed., Kluwer, 2003.

4. M. S. Bazarra, H.D. Sherali, and C. M. Shetty, Nonlinear Programming: Theory and Algorithms, 2nd Ed., John Wiley, 1993.

5. Stephen Boyd and Lieven, Vandenberghe, Convex Optimization, Cambridge India, 2016.

6. Jorge Nocedal Stephen J. Wright, Numerical Optimization, Springer, 2006.