

Academic Qualifications

Year	Degree	Institute	CGPA
2020- Present	M. Tech Industrial & Management Engineering	Indian Institute of Technology, Kanpur	8.00
2019	B.Tech. Mechanical Engineering	NIT Bhopal	7.53
2015	Class XII M.P Board	N.S Singhvi HSS Mandsaur (M.P)	87.8
2013	Class X CBSE	Dashpur Vidyalaya Mandsaur (M.P)	8.8

M. Tech Dissertation

Guide: Dr. Avijit Khanra (IIT K)

Grid operation-based outage maintenance planning: RTE (France Transmission System Operator)

Situation: RTE France is responsible for the operation, maintenance, and development of the French high-voltage transmission system, which spreads across 632834 km^2 approx. Guaranteeing both electricity delivery and supply is one of the most important mission of a transmission system operator such as RTE. Some maintenance operations on the overhead power lines are live line works while others require to shut the power down. The network is resilient enough to endure an unexpected contingency when maintenance is not going on. However, if several breakdowns occur, the grid might face major blackouts. In this context, planned outages due to maintenance work must be scheduled with extreme caution.

Challenge: Generating maintenance schedule for a given time horizon ($\leq year$) are large scale optimization problems and can be extremely hard to solve.

Solution:

- Maintenance planning quality is determined by **mean cost** and **expected excess** (both are risk based and quantified in Euros).
- Developed two MILP models with one minimizing only mean cost and other minimizing both mean cost and expected excess while respecting all business rules and operational constraints.
- Solved MILP models using CPLEX optimisation solver to give optimal solution, Python language was used to code the problem.

Plan of Action: Developing a suite of advance heuristic techniques aiming to generate maintenance schedules in practical computational time. The solution schedule not only takes business rules and operational constraints into account, but also enables the business to gain economical benefits by providing reliable supply to customer.

Academic Projects

Capacitated & Un-Capacitated Facility Location Problem

- ❖ Given a set of supply sources and a set of customers determine which facilities should be open and find the best allocation of supply to customer to minimize cost.
- ❖ Formulated MILP for Capacitated, Un-Capacitated and Single Sourcing version of facility location problem.
- ❖ Developed a Greedy heuristic for NP-hard Capacitated facility location problem.
- ❖ Developed an Algorithm which work on branch and bound technique where Simplex based LP relaxed solution is replaced by a trivially found solution of a transformed LP and hence it is much faster than the original branch and bound method.
- ❖ Solved MILP models using CPLEX optimisation solver and developed algorithm, Python language was used to code the problem.
- ❖ Excel based solver is developed for capacitated facility location problem.

Cutting Stock Problem

- ❖ Objective: To minimise trim loss while cutting standard-sized pieces of stock material into pieces of specified sizes.
- ❖ Formulated an Integer Linear problem with constraints that ensure demand of each size is fulfilled.
- ❖ Decomposed above ILP into Master and Sub-problem to generate optimal cutting patterns.
- ❖ Solved ILP model using CPLEX optimisation solver to give optimal solution, Python language was used to code the problem.

Coach Trip with Shuttle Service Problem | VeRoLog solver Challenge (2015)

- ❖ Objective of the problem is to minimize the total costs of transporting all passengers to the common destination while respecting all side constraints.
- ❖ Passengers are picked up from bus stations and transported to a common destination. Two types of vehicles are available: coaches and smaller shuttle-vehicles. While all coaches terminate at the destination, the shuttles may transport passengers either to the destination or bring them to a bus stop (transfer point) from where they get picked up by a coach.
- ❖ Formulated the problem as MILP and solved exactly using CPLEX solver, Python language was used to code the problem.

Relevant Coursework

Probability & Statistics | Operations Research for Management | Advanced Decision Models | Analytics in Transport & Telecom

Position of Responsibility

Member of Webinar Team, IME, IIT Kanpur

- ❖ Organized 20+ webinar on different topics of data science, ML, Optimization, Supply chain etc.

Teaching Assistant

- ❖ Teaching Assistant in Marketing Management subject in department of Industrial and Management Engineering, IIT Kanpur.

Advanced
Decision
Models

Operation
Research for
Management

Analytics In
Transport &
Telecom