

Yash Vinayvanshi

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Academic Qualifications & Scholastic achievements

Degree	Institute	Score	Year
Bachelor of Technology (Major : Computer Engineering)	Faculty of Engineering & Technology, Jamia Millia Islamia, New Delhi	CGPA 9.59/10 (till 6th Sem)	2019 -2023
Higher Secondary School/Class12 (Physics, Chemistry, Math, Biology)	Kendriya Vidyalaya, AGCR Colony, Delhi	92.6%	2019
High School/Class10	Kendriya Vidyalaya, AGCR Colony, Delhi	CGPA 10/10	2017
• GRE General (Quant: 167/170, Verbal: 147/170, AWA: 3.0/6.0)			2022
• TOEFL(Reading: 29/30, Speaking: 27/30, Listening: 25/30, Writing: 24/30, Total: 105/120)			2022
• Selected for the role of Research Engineer at the Centre for Development of Telematics, India			2022
• Qualified Graduate Aptitude Test in Engineering (GATE) in stream Computer Science & Information Technology(CS&IT) with All India Rank of 2799 out of 77,257 Candidates			2022
• Qualified GATE (Electronics & Communication Engineering) with All India Rank of 2306 out of 54,292 Candidates			2022
• 97 percentile in Joint Entrance Examination-Main (Bachelor of Technology) in 1 Million Candidates			2019
• 99.3 percentile in JEE Main (Bachelor of Architecture) in 0.15 Million Candidates			2019
• Achieved 1st position in Jawaharlal Nehru National Science, Mathematics & Environment Exhibition for the project "In-wheel Suspension system & its analysis"			2018

Research Projects

- "A new polynomial time heuristic for the hamiltonian cycle problem"** **2021**
Draft ready to be submitted for review | Guide: [Prof. Tanvir Ahmad](#) | draft
 - Discovers atomic cycles in a graph and merges them to produce larger cycles. The heuristic takes guided local decisions on which cycles to merge to avoid any unreachable vertex in the future.
 - Designed an augmented data structure to transform the exponential search space of simple paths into a generally smaller search space of atomic cycles. Used a binning approach to filter out neighbouring cycles and save searching costs in the implementation.
 - Implemented this $O(n^3)$ time algorithm on the famous FHCP dataset and detected very large cycles in several large(upto 1000 vertices) and difficult-to-solve instances using standard heuristics.
 - Currently working on establishing bounds to obtain an approximation algorithm for finding large cycles in hamiltonian graphs and on the average case analysis of the heuristic.
- "A new heuristic for the longest path problem"** **2022**
Draft ready to be submitted for review | Guide : [Asst. Prof. Musheer Ahmad](#) | draft
 - Uses an augmented breadth first search which prunes and implants subtrees in the BFS tree based on cross edges to discover larger paths between source and destination.
 - Produces exact results in several graph families including grid graphs, stacked book graphs etc. in polynomial time and is found to produce close to the longest path in several difficult graphs.

3. "Effect of cycles on number of k-paths"

ongoing

Independent project

- There distribution of k-simple paths in a graph changes in specific patterns when a k-cycle is introduced in the graph. Some patterns are identified in specific families of graphs which can be encapsulated in recursive formulae and can be used to find the number of k-simple paths in polynomial time.

4. "An OCR technique based on relative spatial signatures of characters"

ongoing

Independent project

- Produces the distance histogram from an anchor pixel to all other pixels in the binarised image. Compares the nature of the distribution of a new character to benchmark character distributions and classifies it based highest similarity. The current implementation achieves an accuracy of 83% on the MNIST Dataset. Working on new similarity measures to improve accuracy.

Internships & Projects

1. National Informatics Centre

Research Intern | Mentor : Mr. Chandan Pandey (Scientist) | Report & Certificate

May 2022

- Modelled the transportation problem in the supply chain of Food Corporation of India as an electrical network and demonstrated its use in producing approximately optimal transportation schedules with minimised cost. The optimisation formulation for the given multi-constraint supply chain is NP-Hard.

2. Conference Management System

2020

Database Management System course project | Guide: Asst. Prof. Faiyaz Ahmad | Github

- Developed a web application using PHP backend and MySQL database for management of submissions in a conference. Produced the SRS document, Designed and Optimised the database schema and implemented a role-based functionality for reviewers and submitters.

3. GraphSim

ongoing

Independent Project

- A graph simulator and calculator application. Provides a scratchpad with various editing features for building graphs and simulating several graph algorithms on them. Working towards building a networked version where people can share their graph projects and collaborate.

4. Fambook

ongoing

Independent Project

- Builds family trees and performs pedigree analysis across lineages.
- Using the Poly tree data structure to encapsulate the relationships between different family trees.

5. Travelling Salesman Map of India's 726 Districts

- Implemented several heuristics and approximates algorithms for TSP and obtained the best tour of length 58,000 km on 726 district centres of India using simulated annealing.

Technical Skills

Programming Languages	<i>Proficient:</i> C/C++, Python, <i>Competent:</i> Java
Web Development	<i>Competent:</i> HTML5, CSS, JavaScript, PHP, MySQL
Software & Tools	Git, Latex, MS Excel.
Parallel & Distr. Computing	MPI, OpenMP, CUDA
System & Hardware	Bash Scripting, Assembly programming (Intel 8051, 8085, 8086).

Positions of Responsibility & Extra Curricular Activities

1. Student Placement Coordinator

- Collaborating and interacting with companies for their recruitment at Jamia Millia Islamia (JMI).
 - Organising and coordinating on-campus recruitment activities.
2. Conducted a seminar on "Blockchain in cryptocurrency" as part of seminar coursework
 3. Conducted a seminar on "Stepper Motor & Its application" as part of the Embedded Systems course.

Some illustrations from my work

1. "A new polynomial time heuristic for the hamiltonian cycle problem"

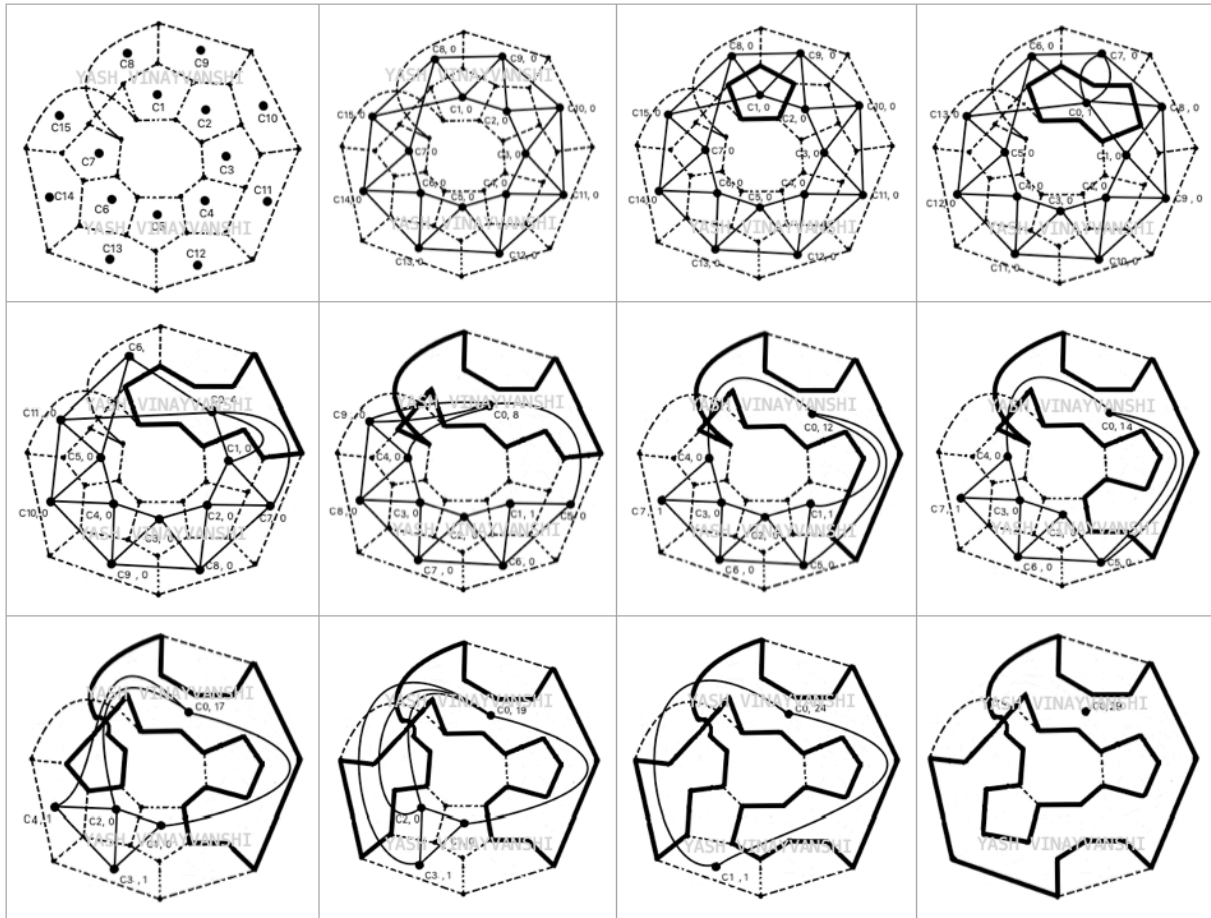


Fig1. An illustration of my heuristic discovering a hamiltonian cycle in a tricky instance

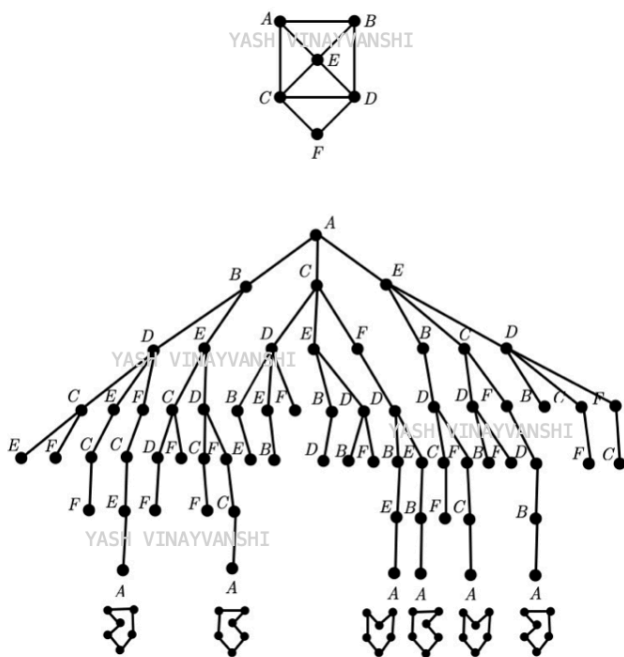


Fig2. The search space of HCP for a given graph

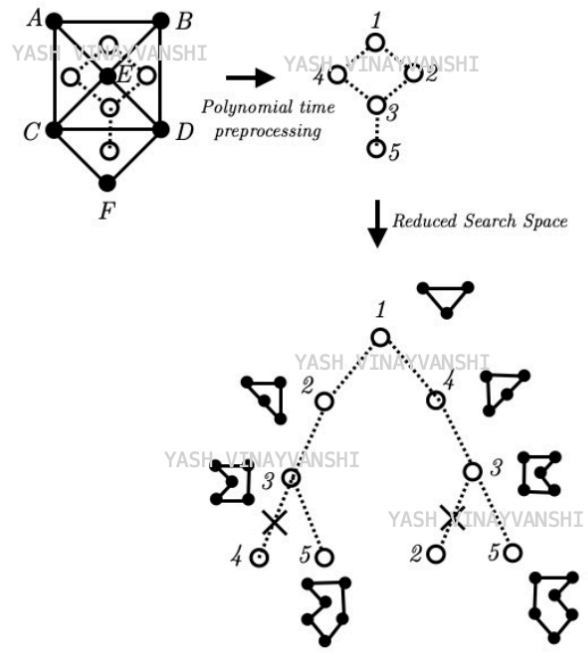


Fig3. The generally smaller transformed search space of indivisible cycles produced in my heuristic.

2. "A new Heuristic for the longest path problem"

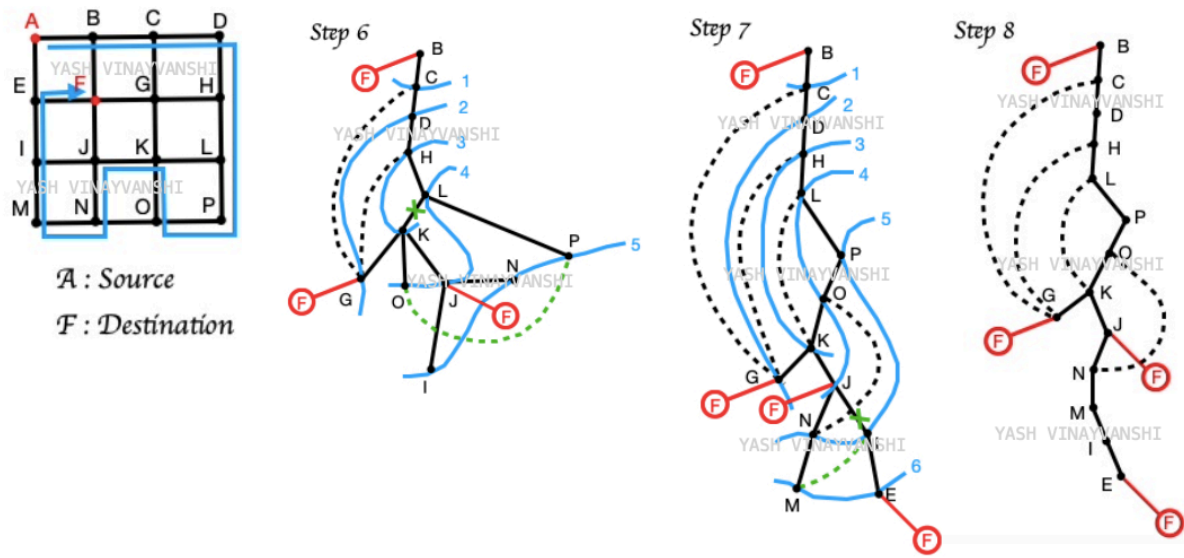


Fig4. A few steps in my heuristic for longest path problem finding longest path from a source vertex to a destination vertex in a grid graph.

3. "An electrical network based model and solution method for transportation planning in food grain supply chain.(Case: Food Corporation of India)"

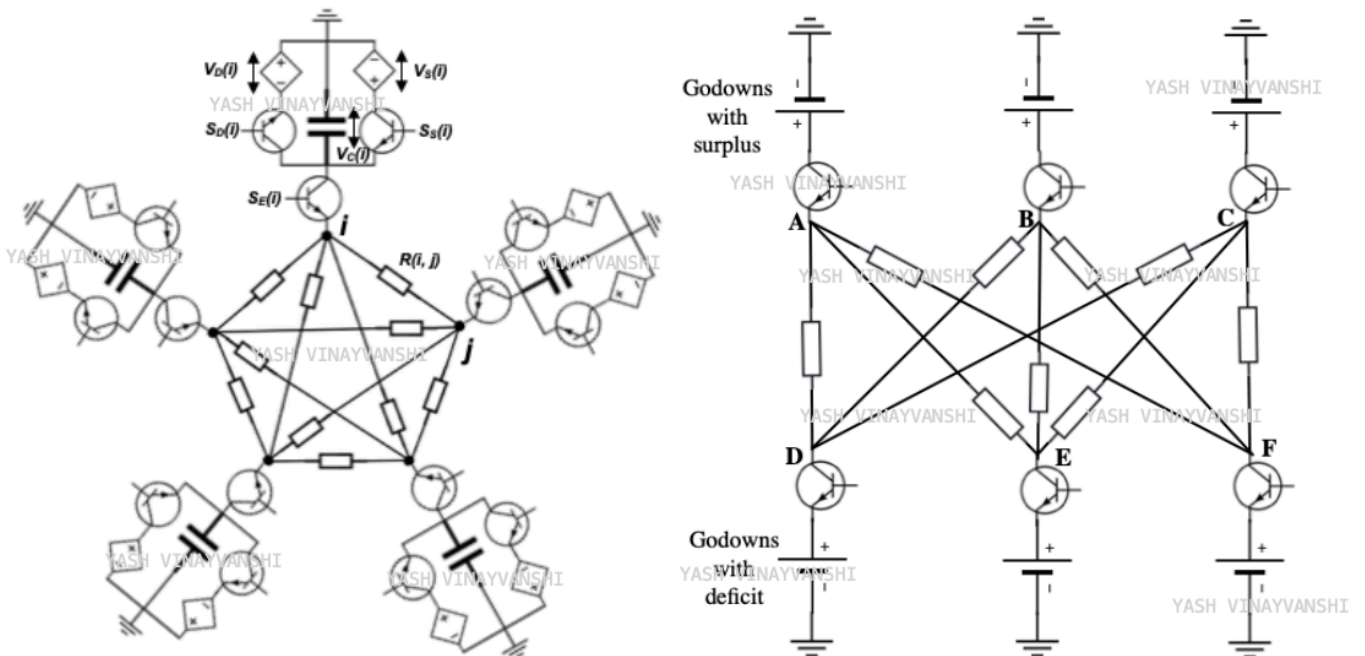


Fig5. A few circuit models of a supply chain to achieve different objectives.