

CS 312: Artificial Intelligence Laboratory

Task 2: Heuristic Search Algorithms

Choose a domain of your choice and compare, analyze and efficiently implement the following search algorithms:

Enter the domain opted [here](#).

Note: Each group should select different domains. Domains will be allocated on FCFS basis. Deadline to finalize domains 6: 00 pm 16 Jan 2020.

1. Best First Search :
Try out a minimum of 2-3 different heuristic functions and compare the results with valid reasoning. Use a priority queue for the OPEN list to make it computationally efficient.
2. Hill Climbing :
With a slight modification of code, implement Hill Climbing for the chosen domain.
3. Variable neighborhood descent :
Modify Hill-Climbing Search to switch to a denser neighborhood function when stuck at a local optimum.
4. Beam Search :
Code for different beam lengths and find the optimum beam length in terms of:
 - a. Time Complexity
 - b. Space Complexity
 - c. Closest to the goal node
5. Tabu Search :
Implement tabu search and find an optimum tabu tenure value for your domain.

For tasks 3, 4, and 5: If the chosen domain is not compatible with Solution Space Search, implement for a basic SAT problem.

Evaluation Criteria:

Choosing an appropriate Domain : 5

Correctness: 15

Report: 20

Code Quality: 5

Viva: 5

Deadline: 11:59 PM 21 Jan 2020

Late Submission Policy: 5% of marks will be deducted per day late.

For Reference :

Heuristic search: <https://youtu.be/dtGRmhZ6Cuo>

Hill Climbing: <https://youtu.be/ZOvRZ7UJMjk>

Beam Search: <https://youtu.be/Fioj-Zx-PHA>

Tabu Search: <https://youtu.be/wrkMM6a4S-U>

Report Format :

1. Brief description about the domain:
 - a. State space
 - b. Start node and goal node
 - c. MOVEGEN and GOALTEST algorithm
2. Heuristic functions considered (minimum of 2)
3. Best First search analysis and observation
4. Hill Climbing and Best First search comparison in terms of:
 - a. States explored
 - b. Time taken
 - c. Reaching the optimal solution.
5. Beam search analysis for different beam lengths
6. Tabu search for different values of tabu tenure
7. Comparison of Variable neighborhood descent, Beam Search, Tabu Search