

The objective of the project is to work on an idea in which at least one of the components should involve AI. The emphasis should be on the uniqueness and creativity (in terms of problem and/or its solution), rather than working on a well-known/well-studied problem or solution. One should think carefully about how to solve a problem using one of the search techniques that we have covered/will cover in this course. E.g., doing automatic image classification (problem) using a CNN (solution) is not unique/creative with respect to either the problem or the solution, however one may think about posing this as a search problem and then come-up with some unique solution (it is okay if your solution does not give high accuracies in this particular case). Each project (i.e., both the problem as well as the solution) will be graded individually on the basis of originality, soundness, creativity and clarity. The proposed solution may involve some hardware components as well.

Broad topics for the project: Energy, Food, Water, Housing, Mobility, Security, Environment, Health, and Internet.

Deliverables:

- (1) A detailed report
- (2) A brief (2-3 minutes) video of the presentation
- (3) A brief (2-3 minutes) video of a working demo of the project
- (4) All the relevant codes
- (5) An executable file (that can be run as an application)
- (6) Viva*

(*: It will depend on the overall performance of the class, and will act as a scaling factor.)

=====

REPORT WRITING:

Introduction:

Provide a motivation and brief overview of the problem. Elaborate on the class of problems (e.g., uninformed search, informed search, CSP, local search, etc.) the given problem statement falls in. Describe what is novelty in the problem statement, and what are the practical constraints that make it difficult/challenging.

Problem definition:

- * Provide a technical definition of the problem and specify all the parameters.
- * Precisely discuss the technical aspects of the problem: what data is needed, and define the states, cost function, start state, goal state/test, etc.

Background survey:

Discuss what approaches have been used to solve this/similar problem(s) in the past.

Discussion:

- * Describe the novelty in terms of your problem and/or solution.
- * Why do you consider your solution an engineering based solution?
- * Discuss the scale and feasibility of the problem and the proposed solution.
- * Validation and demonstration (?).

Algorithm:

- * Recommend the most efficient algorithm that is guaranteed to find an optimal solution among the ones we have studied. Specify any implementation issues that are specific to this problem. For example, if a heuristic is needed, specify it in detail here.
- * Now specify an algorithm that is not necessarily guaranteed to find an optimal solution, but that will be practical in the case of very large problems.

Algorithm Complexity:

- * Estimate the size of the state space as a function of the parameters specified in the problem. Estimate depth to goal and branching factor. Say whether each of these things grows linearly, polynomially, exponentially, or worse, as a function of the parameters.
- * Estimate the complexity of the algorithm used to solve the problem.

Worked example (if applicable):

Work out a small example by hand. Simplify as necessary to convey the key ideas in your approach.

Summary and Conclusions:

Summarize your project and discuss the conclusions. How feasible is solving the problem? Given a hard time constraint in advance (an hour, say) will you always find some answer? What was hard about this problem? What required insight about the specific problem?

References:

If you consulted any references, list them under this heading.