The Quest for the Perfect Degree Plan

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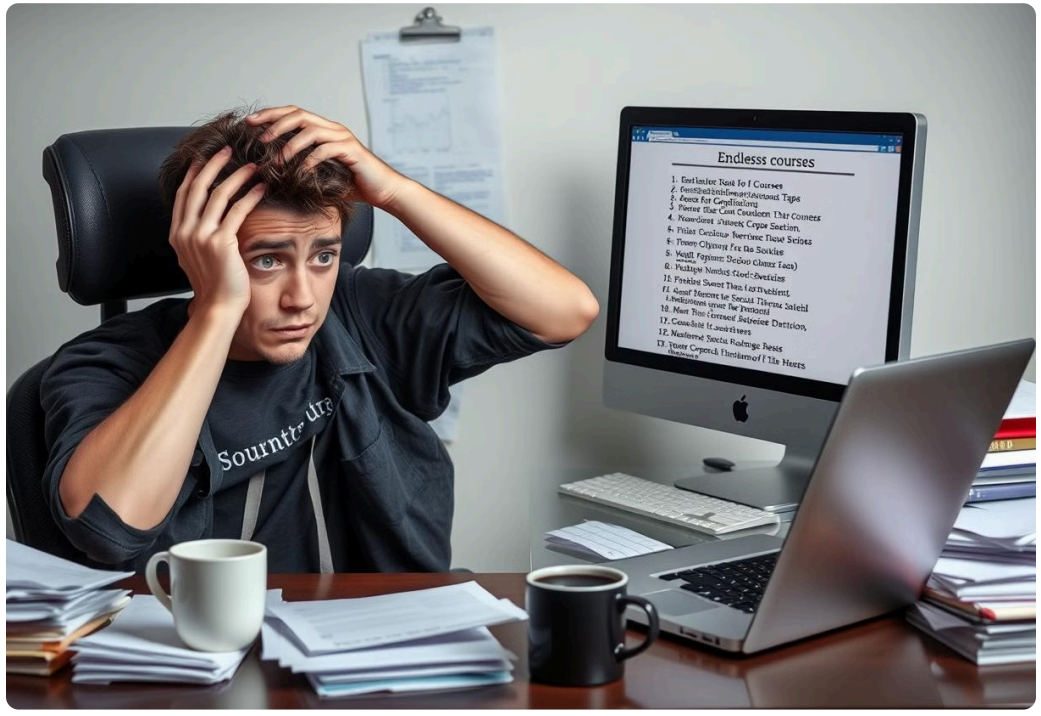
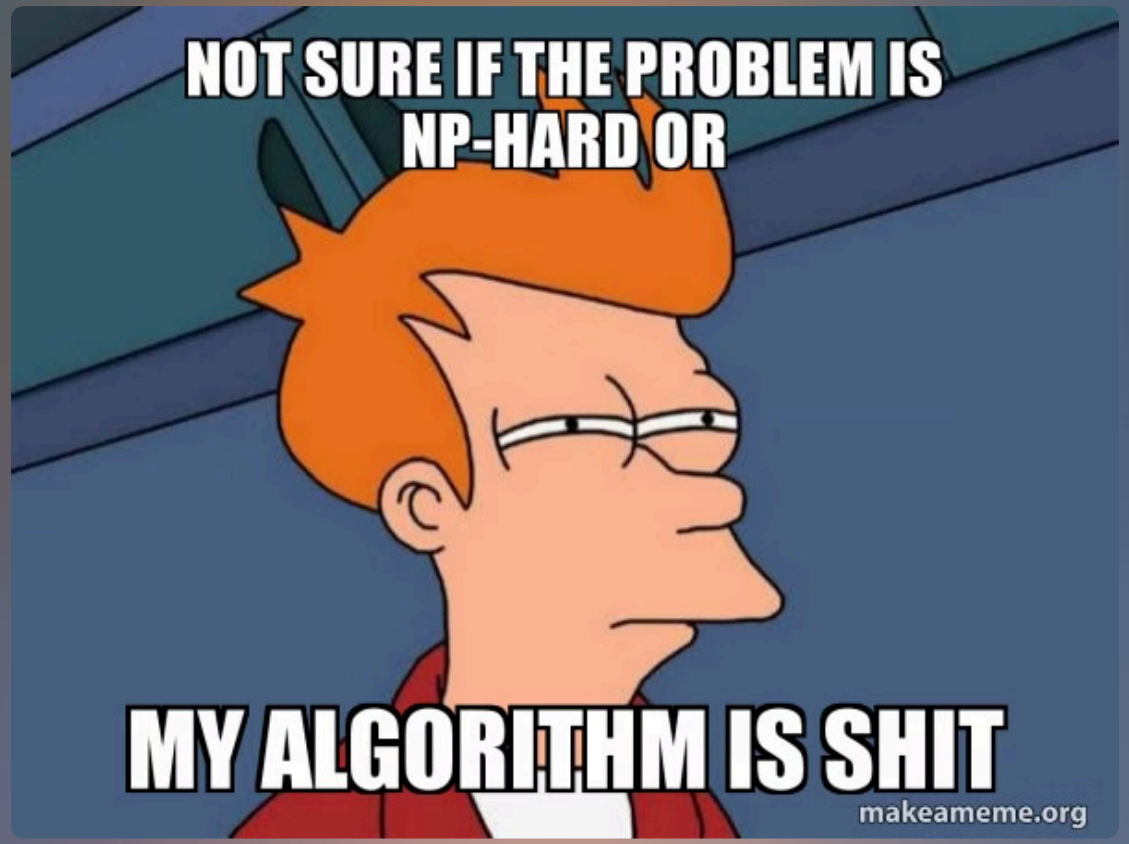
The problem

Complex Requirements

Finding the optimal degree plan that maximizes your GPA while fulfilling all requirements can feel like an impossible quest.



Why So HARD !?



AI to the Rescue

We harness the power of AI to tackle this complex problem.

Local Search :

- Hill climbing

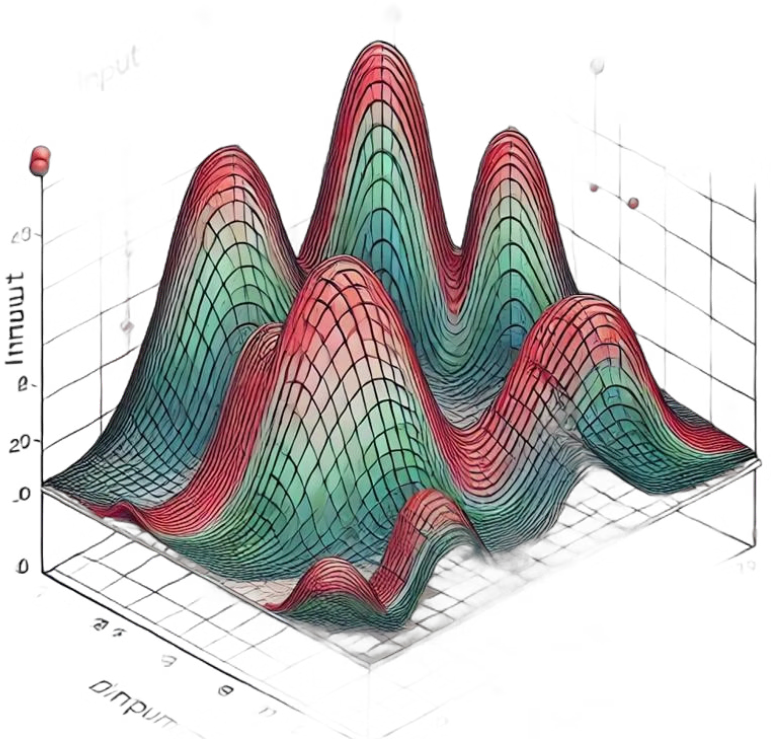
- Simulated Annealing

- Beam Search

Graph Search :

- A* Search

- DFS
- UCS



Modeling the Local Search Problem

State

Nearly legal degree plan

Neighbors

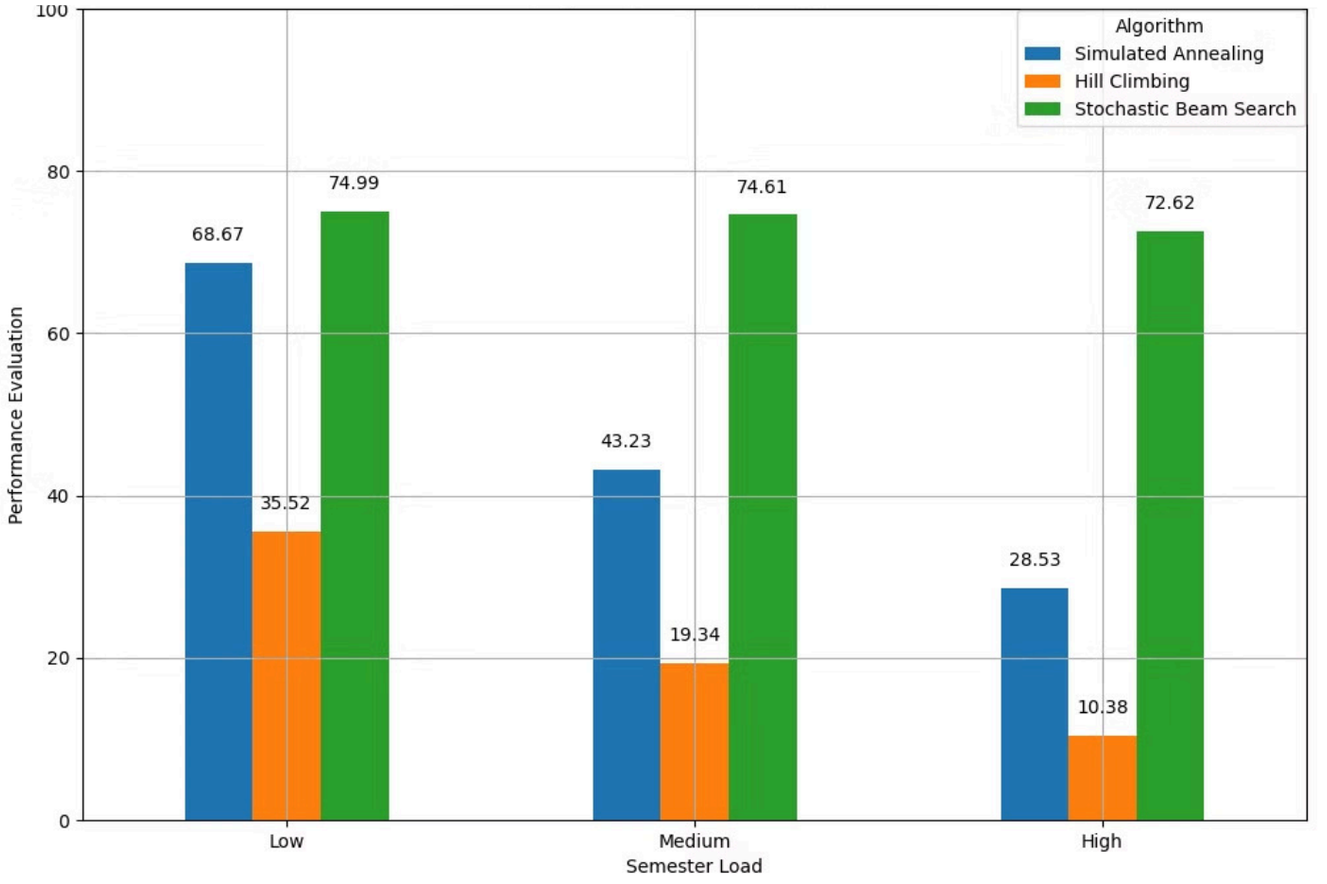
Add | Remove | Replace

Fitness Function

$$\forall s \in S \qquad Fitness\,(s) := \begin{cases} avg^*\,(s) + 100 & \text{legal degree plan} \\ avg^*\,(s) & else \end{cases}$$

$$\forall s \in S \qquad avg^*\,(s) := avg\,(s) \cdot \frac{points\,(s)}{\text{Degree Target Points}}$$

Comparing the Results - Local Search



We compare the performance of the algorithms based on key metrics.

1

Hill Climbing

Fastest, but barely legal.

2

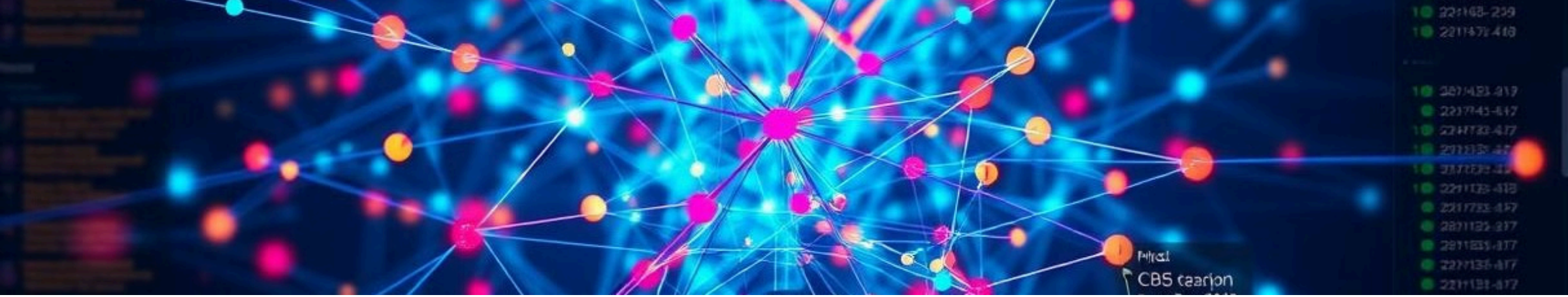
Simulated Annealing

A step towards exploration.

3

Stochastic Beam Search

Balances exploration&exploitation, but slow.



Modeling the Graph Search Problem

1

2

3

State

Current course selection.

Action

Adding a course to the plan.

Cost

$$C(a) \coloneqq (100 - a.avg) * \frac{a.points}{degree-target-points}$$

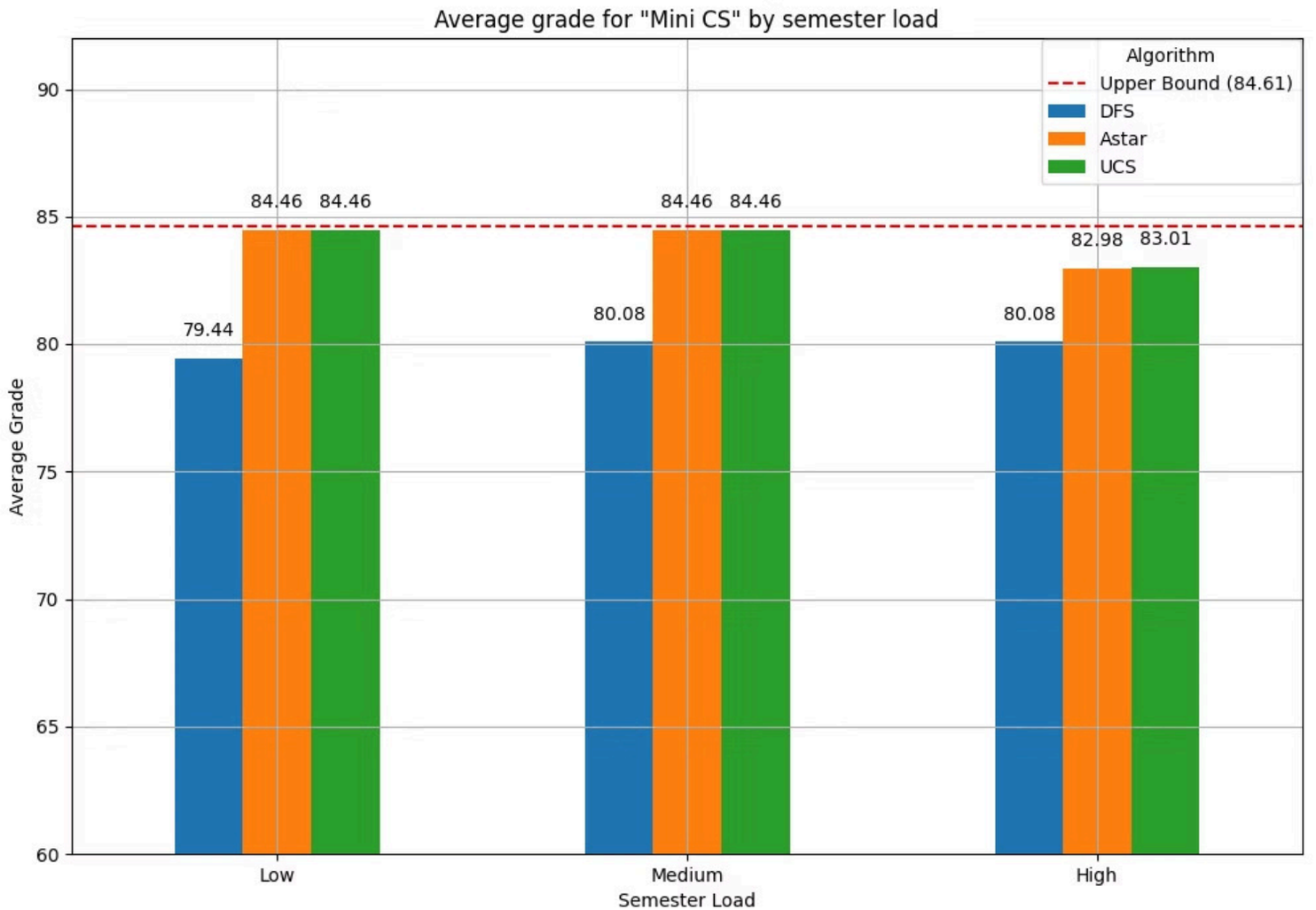
A* Heuristic

Translating our intution into results.

🧘‍♀️ Relaxed

🤑 Greedy

Comparing the Results - Graph Search



We compare the performance of the algorithms based on key metrics.

1

DFS

Fastest, but arbitrary.

2

UCS

Optimal, but takes forever.

3

A*

Something to work with!

Conclusions

AI algorithms provide effective solutions for degree planning.

1

(Graph vs Local) Search

A* is what you want!

2

Future Use

Optmize Everything you can dream of !