

Lab 2: Artificial Intelligence

CSL302

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1. Coal Blocks Auction (Local Search)

State Representation

The state of the problem is modeled as allotment of bids to each company. Each company is allotted either a valid bid indexed between 1 to B where B is total number of bids OR a null bid represented by index -1.

Example of a particular state

Company 1-indexed	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
Bids 1-indexed	B1	B5	-1	B9	B11	B12	B15	-1	B17	B20

Successor

The successor state is generated by removing the current allotted bid and then trying to allot a new valid bid for the same company.

Local Search

We have implemented stochastic hill climbing with **random restarts** as our solution. There are two main functions - *HillClimb* and *solution*.

HillClimb take current state and makes it reach maxima.

solution uses Hill climb with restarts to get to global maxima.

Stochastic hill climbing chooses at random from among the uphill moves (successors with better objective function); where the probability of selection vary with the steepness of the uphill move. This usually converges more slowly than steepest ascent, but in some state landscapes, it finds better solutions.

2. PacMan (Multi Agent Adversarial Search)

Evaluation Function

The evaluation function for current state is based upon 5 features in total

Feature : x	Function : f(x)
Distance from Ghost	$\frac{1}{x}$
Total remaining food distance	$\frac{1}{x}$
Total remaining capsule distance	$\frac{1}{x}$
Count of remaining food and capsules	$-2x$
Score of Game and sum of Scared Times of Ghosts	$5x + y$

Observation

1. A **peculiar case** was seen as we are using expectimax agent. The **agent usually waits near capsule for Ghost** to arrive and when the Ghost arrives, PacMan eats the capsule and then the Ghost to get a big Score boost. Though this sometime menas PacMan waits for a long time.
2. The constant of -2 for the count of the remaining food and capsules signifies that a state where there is no food and where there is only one food remaining at distance 1 are not equivalent.
3. **Score of Game** have been given **highest weight** since the Score is most important parameter in itself.