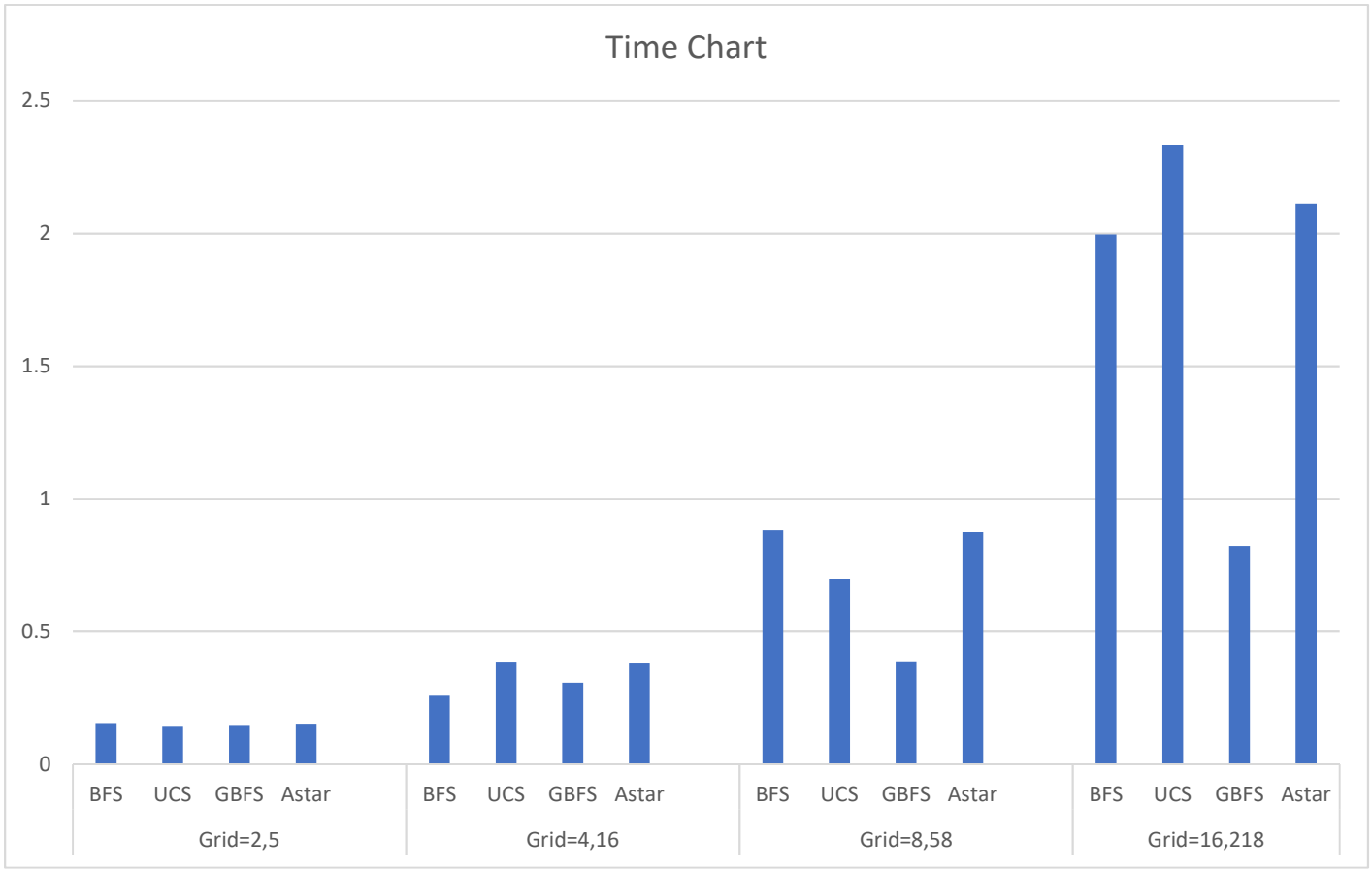
Programming : -

Task 2

Bar plot of different algorithms with respect to time and different grid size

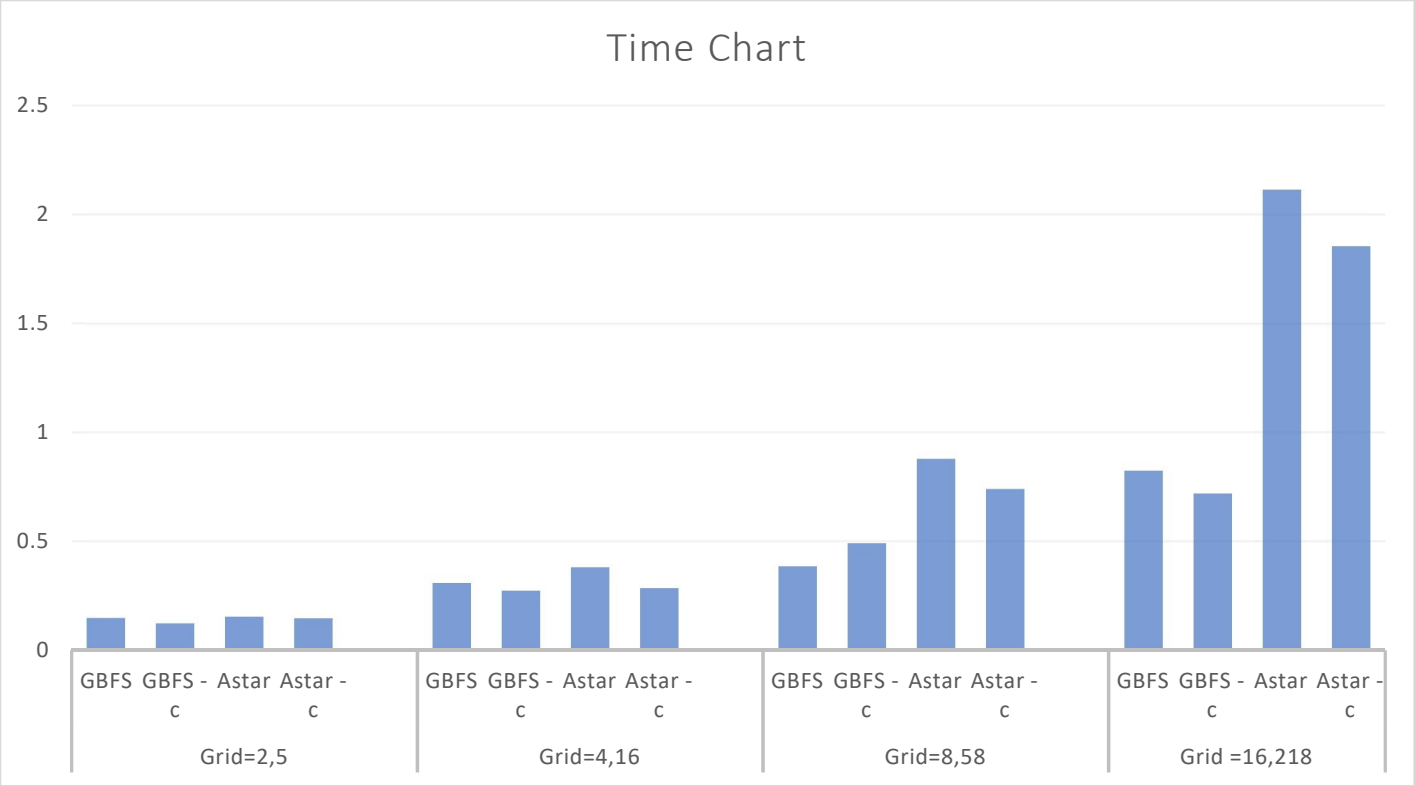


Task 3:

Bar-plot of GBFS and Astar algorithm with/without custom heuristic with respect to time.

Heuristic: def heuristic(current_state):

A= goal_state.x - current_state.x + goal_state.y – current_state.y
If current_state.orientation in [‘South’,’West’]: a++
else: a—
return a



Explanation:

Since heuristic is a distance-based heuristic, in custom heuristic for all the state which are in either South or West direction will have higher heuristic value because it will lower the value for same state x and y coordinates with direction towards goal and that will eventually optimize the path towards goal.

More improved Heuristic: MoveB is having higher cost than MoveF and there always be a path to any node through which we can reach without using MoveB. For ex. If combination of TurnCW and MoveB can reach a node A then you can always choose alternate path with TurnCCW and MoveF combination to reduce cost. Thus A* algorithm will never have a MoveB action in their path i.e. we can also remove MoveB action expansion while exploring a tree which will eventually compute heuristic for fewer nodes.