

My heuristic is an extension on the utility heuristic provided by the professors. The basic utility heuristic is the assignment of values to each piece on the board. As the red/max player, our AI goes first so we assign our “man” pieces a value of 1 and our king pieces a value of 2. The black/min player’s “man” pieces are assigned a value of -1 and their king pieces are assigned a value of -2. For my heuristic, I identified that the man and king pieces for each player don’t just determine the advantage. There is a plethora of other ways to assign heuristic costs and find who is winning in the current position. Other factors I took into consideration are:

1. Number of pawns adjacent to the edge of the board (+2 points each)
2. Number of kings adjacent to the edge of the board (+3 points each)
3. Number of unoccupied squares on the king’s promotion line (-1 point each)
4. Number of defending pieces, i.e. ones situated at bottom two rows for the player (+1 point each)
5. Number of attacking pieces, i.e. ones situated at the top three rows for the player (+1 point each)
6. The existence of this pattern among a player’s pieces (1 point each):



7. The existence of this triangular pattern among a player’s pieces (1 point each):



These 7 mini heuristics and the values assigned to “man” and king pieces were added in a linear combination of their occurrence multiplied by the point assigned to each. I was able to use this heuristic cost which is still admissible and gives us a better idea of the positional awareness of the player’s surroundings.

One way to even further give more accurate results on these linear heuristics is to assign phases for the game. We could have a beginning, middle and end. The beginning would consist of each player having 4 or more “man” pieces (which can be easily checked) and no kings being present. In that case, these heuristic values assigned to the 7 listed considerations would hold. In the middle game however, we’d check for each player have 4 or more pieces and at least 1 king being present on either player’s side. Then, we could tune the heuristic costs accordingly, with more points being given to heuristic #3 and #5 on the list as they are the most attack oriented and the game is about to be opened up. Finally, in the end game, there are at most 4 pieces on one’s player’s side. More of an associated cost would be put towards the patterns seen in #7 as it is indestructible and king pieces. This non-linear approach with phases during the game and changing heuristic costs to the heuristic categories defined will make for a volatile AI which is able to perform better.