TEAM HODOR!

Vaibhav Bhosale	Chandra Mohan Soni	Amit Malav
130050007	130050020	130050032

STRATEGY

The strategy we have used is very simple. We basically want to finish the game as soon as we're on the lead (have more no. of ships) and when we're at a loss, we defend our planets and try to acquire other planets slowly. As soon as we recover, we attack the enemy with full force. We have divided possible game situations into 4 categories. These categories define what further action needs to be taken.

1). Fully Attacking:

In This Phase we stop capturing the neutrals and go full on attack on the enemy. This Stage is Triggered when we have sufficiently higher amount of ships than the enemy (say 1.2 times and higher).

Functioning:

We find the enemy planet with the maximum number of ships as target and we send some number of ships from all the planets we own to the target.

Idea:

The idea behind this being that, once we have a bit of stronghold onto the game, we try to completely dominate the opposition by first getting its strongest (in terms of number of fleets) planet and then subsequently capturing the other planets.

2). Aggressive Attack with Defence:

In This Phase we attack aggressively on the enemy and we also defend the planets that are being attacked by the enemy i.e. we give more value to the enemy planets. This Stage

is Triggered when we have more ships than the enemy but not enough to go on all out attack.

Functioning:

Basically we have 2 different functions, one of which attacks and the other one provides defence. The Function and the heuristics for all the following stages is the same but the constant values and the factors are changed thereby defining the level of aggressiveness and the behaviour. In this state, we multiply a high factor to the enemy planet's score. Also, we firstly make a list of all the planets and the score. Then we find all the planets with a score in the top few percentages in the list and of them we get those top planets which we can attack them without losing say half of the planets then we attack them

a). Attack:

Heuristic:

$$Score = \frac{growth\ rate \times enemy\ surround\ score}{number\ of\ ships \times my\ surrounding\ score}$$

$$Surrounding\ Score = \frac{Number\ of\ ships}{Distance\ betweeen\ the\ planet\ and\ the\ target}$$

In order to get the Enemy surrounding score and the my surrounding score are Surrounding Score calculated for the enemy planets and the my planets respectively.

b). Defense:

We check for all the planets that we own and find out which one are under attack. Then we assign a safety score (provided below) and check if the safety score is greater than some constant times the incoming ships. if the score is high, we send some reinforcements from all the ships to the planet under attack.

$$Safety\ Score = \#Ships\ on\ the\ planet + fac. \times \Sigma(\frac{No.\ of\ ships\ on\ my\ other\ planets}{Distance})$$

3). Normal Attack:

This happens when we have considerable but less ships than the enemies. In This Phase we attack on the Neutral Planets and the enemy planets on similar criterias. Also, we attack only one planet at a time, since we're already at a loss and can't afford to lose much more.

4). Defensive Attack:

This state is useful when the enemy is dominating us and we need to back off. Since, in this stage we're at a loss facing the enemy, we not only defend our planets but we also give high priority to the neutral planets than the enemy planets while attacking. As soon as we gather considerable number of planets, we move on to the upper level and the attack becomes more aggressive.

PERFORMANCE ANALYSIS

Statistics

These are some match statistics when played with various test bots. The stats also changes,
when the bot is Player 2.
Below are the stats when our bot is player 1-

Opponent Bot	WIns	Loss
Bully Bot	100	0
Random Bot	100	0
Prospector Bot	100	0
Dual Bot	94	6
Rage Bot	23	77

PERFORMANCE DESCRIPTION

Situations Where Bot Excels

- When the number of ships of both the players is almost equal, our bot attacks ferociously, ensuring that it captures all the opponent ships. This strategy works well when the opponent initially captures a few neutral planets and then tries to capture our planets. Then we, are able to attack him successfully.
- At the point when our total number of ships are significantly greater (>= 1.2 times enemy ships), our bot attacks the opponent with full force resulting in capture of the strongest enemy planet (with most no. of ships), which is followed by eventually capturing all enemy planets
- When the enemy bot attacks only one bot during one turn, we are able to play that bot competitively, winning on most instances.
- Our bot wins the cases when the opponent doesn't attack our recently acquired planets(sniping). This is because, we are sending just a little more than the required number of planets.

Situations Where Bot Fails

- When the opponent bot heavily attacks our home planet, we tend to lose in those cases. The reason being we initially attack on the neutral planets and don't do much defence. At slightly later stage, we attack the enemy's home planet but that doesn't work too well since our number of ships get considerably reduced by then.
- If the opponent attacks more than one planet in one turn, our bot fails to defend its planets since, we concentrate more on defending the most vulnerable planet.
- When the opponent snipes our newly acquired neutral planets, in most of the cases, our bot loses. Since this turns out to be wastage of ships.
- When the number of ships of the opponent bot exceeds the number of ships of our bot, our bot gets too defensive, and if there is a highly attacking bot, we tend to lose in most cases.