The phantom of the Opera

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I - The Inspector

I.1 - The Strategy

Our strategy around the inspector is simple in concept, we try to clear as many suspects each turn as we can. We can for that purpose imagine two states considering the characters who are still suspicious. The characters that are “in groups” and those “alone”.
By determining the number of character that are in the first and second group our AI will take radically different decision :

- Will either try to separates groups in order to isolate targets
- Regroup innocent people together or one suspect along any numbers of determined innocent characters
- Or keep the same number of suspect alone and in group to stay in the same position

In the end the goal is to keep half the suspect alone and the other half in groups.

II - The Phantom

II.1 - The Strategy

The phantom Ai is a bit simpler; in short we look at each turn separately forgoing any long term strategy and just trying to decide the best move for each turn taken in a vacuum state.

For each turn, the phantom AI will iterate through all possible moves for each character, this includes the use of characters power on top of their movements. For example the pink character using secret passages or not or the black character using its pulling mechanic.

We will take all those possibilities to make up a score that depends on how many individuals can remain suspects but also if we can try to scare the carlotta as many times as possible as we remain concealed.

For the score, the AI will check how many suspects there are and how many spaces will La Carlotta move, depending if the fantom can scream or not.

III - Work Distribution

In terms of work distribution , our group started working pretty late on the project , only after 2 weeks in.
First, we decide to split the group into Samuel and Yacine on the inspector and Ka-po on the phantom, our logic being that while the phantom tries to remain concealed the inspector poses more of a challenge being that he has to do guesswork and plan a strategy to reveal the phantom.

During the project Yacine had to change from Samuel to Ka-po from time to time given his low level in python he could only help on a few numbers of things. Like the behavior of some characters or reviewing code and discussing the best strategy or ideas to put in places.

Other than that the majority of the project was led by Samuel on the Inspector and Ka-po on the phantom.

IV - Bonus: Bug detection

During implementation we found a weird bug on the Game.py file, and more precisely on the “lancer(self)” function.

In fact, the number of suspects stayed always at 8 because the check was made only once at the beginning.

```python
def lancer(self):
    """
        Run a game until either the fantom is discovered,
        or the singer leaves the opera.
    """
    # work
    nb_suspects = len([p for p in self.characters if p.suspect])
    while self.position_carlotta < self.exit and  nb_suspects > 1:
        self.tour()
        # Il faut refaire le check du nombre de suspect à chaque fin de tour pas seulement en début de jeu
        nb_suspects = len([p for p in self.characters if p.suspect])
    # game ends
    if self.position_carlotta < self.exit:
        logger.info(f"----------\n---- inspector wins : fantom is {self.fantom}")
    else:
        logger.info("----------\n---- fantom wins")
```

So we added the check at every round to fix this bug.

We think that this is because of a recent commit on the github project named “small modification”. Where we can see this exact thing has been modified.