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AI Resource Summarization

INTRODUCTION

There are many resources available when it comes to researching artificial intelligence in video games. For the purpose of this document, the terms AI, artificial intelligence, and bots will be used interchangeably to mean the same thing. Many of the ideas in this document came from talks given at game development conferences as well as articles and posts on the internet that were thought to be worthwhile. These ideas come from industry professionals that have worked on such games as Splinter Cell, The Sims, Stellaris, and Warframe. On their own, it may seem that these games may not be strongly related to Bronco Drome, but many of the core concepts can be taken and transferred to our project.

WHAT MAKES GOOD AI

As a player, it can sometimes be very easy to tell when AI is “good” or “bad”. Good AI tends to be smart, but maybe not too smart, whilst bad AI usually seems dumb or easily exploitable. To summarize simply, good AI will help enhance the immersion of a game and bad AI will ruin the immersion of a game. By using this definition, we can also say that AI in games can be too “good” if a bot plays the game with what could be perceived as an unfair advantage, the player will likely become frustrated and thus, the immersion has been spoiled.

Considering the previous statement, what we see is that an AI must be fun and immersive above all else. Creating a realistic bot comes second to making a fun bot that is convincing enough as to not break the immersion of the game. Furthermore, bots should be

knowledgeable about the game that they are playing. So knowledgeable in fact that they should be able to teach the player about the game. This does not mean that good bots should lead the player to every secret in the game or beat the player to every power up, but that the bots should be good enough at the game so that the player occasionally thinks “oh wow, I could do that”. Building upon that, good bots should nudge the player to discover new ways of playing the game that aren’t shown explicitly to them.

Good AI should also provide a sufficient challenge to the player. A competent bot may actively choose to attack less or sometimes ignore the player to achieve a certain level of difficulty. Even the most realistic and elaborate AI might be too easy for a player and they could quickly become bored. Alternatively, the most dumb and brainless AI can have too many unfair advantages to compensate for their simplicity. In this case, the player would likely become frustrated by the game's difficulty. Even though a bot may appear realistic in its movements and actions, it may be very convincing and have agency, it does not mean that it is fun to engage with. A game’s goal first and foremost is to always be fun above all else.

BRONCO DROME DESIGN PROPOSALS

Using the lessons learned in the previous section, we can make some suggestions for the overall AI design of Bronco Drome. Firstly, it is important to understand the current state of the game’s AI. From a glance, it appears that the bots in bronco drome have a very simple behavior and offer very little in terms of surprises or noteworthy gameplay. Because of this, we will assume that we are starting almost fresh on the AI for Bronco Drome.

Firstly, we will discuss the movement of the AI. One possible suggestion that was noted by a developer from the game Warframe would be to use the movement of the player to help teach the bots. This could be achieved by making various heat maps or graphs of player movement around the map. This way, the bots can have movement that seems far more

organic. I believe that this can be implemented in Bronco Drome by recording the movements of players who are playtesting the game once the map design has been finalized. Next, the movements can be converted into paths that the AI can follow. Whenever the AI is not actively doing something else such as engaging in combat with a player, it can be following an approximation of a path that other players have already driven. Not only does this lend more natural and realistic movement to the bot, but it also helps with the aforementioned design aspect of using the bots to teach newer players. A new player might see a bot going to an area on the map that he or she did not know about, or maybe getting to a power-up that the player was not aware of.

The next suggestion would be to have the AI react to the player in different ways. Not only should the AI react to the player, but its reaction times should be realistic. For example, the AI should not immediately react to the player upon sight. Bots should have different reaction times based on the situation. It is well known in psychology that humans have different reaction times based on what they are reacting to. This design philosophy was upheld by Ubisoft in the development of Splinter Cell Blacklist. Developers noted that their AI would react at greatly different rates depending on the stimulus. For example, if something were to happen in the immediate vicinity of an AI, they would likely react very quickly, but if a similar stimulus were to happen far away or on the edge of the vision of an AI, they may react more slowly or not at all.

Another suggestion that came from Ubisoft would be to have the peripheral vision of bots set to an irregularly shaped cone. The shape of the cone should taper inwards and become more narrow in the distance. This more accurately mimics the vision of humans. You are likely to notice things right in front of you even if they are far away, but less likely to notice them if they are far away and on the edge of your vision.

This can be manifested in Bronco Drome by tweaking how the AI reacts to seeing or hearing a player. It would be unrealistic to have the AI immediately drop whatever it is doing and follow the player if the player's cart sneaks just barely into the bot's field of view from very far

away. To expand upon this, maybe the AI might choose not to attack the player. Perhaps the AI is low on health or notices that the player has a strong power-up. The bot might try to flee and wait out the power up, or to try to evade the player and come back later with more health or a power-up. This takes us to a way of making the AI seem more human-like. Perhaps the AI died in battle with a human player and was almost able to defeat them. Upon respawning, the AI can path to the place on the map where it last saw the player in order to try to defeat them.

The final noteworthy suggestion for AI design would be to have it dynamically react to the player and other in-game pieces. For example, when a player fires a missile, a global flag could be set. All nearby bots could read this flag and possibly try to evade the attack perhaps by jumping or turning. To build on this, the aggressiveness of an AI can be tweaked dynamically. If a player is able to quickly land hits on a bot without taking damage in return, the bot may realize that it is going to lose the fight. Instead of trying to attack the player, the bot may run or seek cover. Alternatively, if the bot is damaging a player that is near death, the bot may double down and become more aggressive in order to secure the kill on the player. This can be further expanded upon with bot decision making. Maybe a bot comes across a player fighting another bot in a free for all context. The bot could choose to attack the most damaged cart in combat, then turn its attention to the remaining cart to be more effective in that combat encounter.

CONCLUSION

In conclusion, there are many small details that go into making convincing game AI. Developing a fun and realistic bot for a game is a massive undertaking that thousands of professionals around the world have dedicated themselves to since even before the advent of gaming. Learning from them is a surefire way to generate great suggestions for developing your own AI.