

Topic: How to apply ai in star wars pod racing

Essay Structure:

Intro - Introduce the game and set up how AI can be used to pay it

Thesis- talk about the three techniques that can be used to play it (ex. Planning, deep learning etc.)

Pod Racing in star wars is a dangerous, high speed and thrilling racing game that takes place in the universe of star wars. With the fast paced nature, unpredictable obstacles and unique course design, it makes it a perfect place to test various techniques in artificial intelligence, which can optimize giving an edge to a competitor over others. This essay explores how the three different AI techniques; heuristic search, bayes net and deep learning can be applied to this game and help master Pod Racing.

Body paragraphs

Paragraph 1: - technique 1 Heuristic Search

Heuristic search is a search strategy that attempts to optimize a problem by iteratively improving the solution based on a given heuristic function or a cost measure. It estimates how close a state is to a goal and chooses the best path to get to it by estimating the distance at each step. Each state in the state space. In star wars pod racing, the environment is dynamic and the speed is extreme, and there are heavy costs in making poor decisions like going off track or worse. That is why a heuristic search provides a way for AI to choose racing paths and actions that balance safety as well as efficiency. For the heuristic search, the state space would include the position of the pod, its velocity, angle(orientation, proximity of the opponent pods, cooldown of boost and the danger level. At each state, the pod can choose among several different actions, such as maintain course, brank, turn left and tight and use boost and accelerate. Which of these actions the pod will take will be determined by which step optimizes these states the best and provides the best case scenario. A\* search is particularly useful in this circumstance because it can balance optimality and efficiency. It uses a cost function f(n) + h(n) where g(n) is the cost from the start to node n and h(n) is the heuristic estimate of the cost of node n to the goal. Now to construct the heuristic function, it must be informative about the fastest path but also take into account how dangerous it is. Because of this, with the danger level in the state space, we can incorporate this into our heuristic by making h(n) = estimated time +danger\_penalty by taking into account the other state space information for the estimate time and adding the danger penalty so that the heuristic tries to minimize the danger level and time to complete the race to find the most optimal path possible.

Paragraph 2 - technique 2 - Bayes net

Bayes net is a technique that is used to describe models using simple conditional probabilities. It takes random variables and measures the relationship between them in order to get probabilities. In pod racing, they can be used to model uncertainty and relationships between aspects of the race, which gives opportunity for intelligent decision making. The random variables that can be used are the track condition, speed, turn sharpness, engine temperature, crash risk, damage level, and opponent proximity. The engine temperature depends on the speed, track condition, the crash risk depends on the speed, turn sharpness, and opponent proximity. The damage level depends on the crash risk.

Paragraph 3 - technique 3 - deep learning

Deep learning allows AI to learn complex relationships between inputs and outputs, which is very useful for the visually dynamic, fast and obstacle oriented environment of Pod Racing. These models are able to extract data and make decisions and learn based on that data. With deep learning, the AI model is able to take in visual data from the game and process it as vectors, and take data from the pod itself such as the current speed, damage level, engine temperature and proximity to opponents and historical race data from the past, and use loss functions such as binary cross entropy, mean absolute error to reduce it error as it learns the best possible path to success. Because deep learning can be used for object detection and classification, it can be used to scan the surroundings for danger level - scan opponents, obstacles using computer vision. Based off the data from the deep learning models, the other models, bayes net and heuristic search can get the data necessary for each step to make informed decisions, so this technique is crucial for visually getting real time data from the track and scanning the interior data of the pod and learning from past races as well.

Conclusion - Restate thesis and summarize arguments, and give final ending sentences to end off essay