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Artificial Intelligence and Machine Learning in Game Development

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Abstract: Machine learning have a huge impact in video games, in this we will learn about use of machine learning in game development. Video game developers use machine learning to give users more realistic feel in the game. Non player characters (NPCs) algorithm are used to provide real like characters to the game and also increase the challenges for the players who are playing that game. Nowadays games are becoming more real than ever, we have to face more challenges in it. There are many games which are currently using machine learning and it might be the future for game development. Now games can also be experienced over VR (Virtual Reality), players can actually feel the game by just using VR technology, all thanks to AI.

Keywords: Artificial Intelligence, Machine Learning, Game Development, Artificial Intelligence in Game Development, Machine Learning in Game Development, AI, ML, Game development future, AI in games, ML in games.

1. INTRODUCTION

Machine learning is been helping game developers to provide more realistic and challenging environment for gamers [1]. Many games like call of duty: Warzone, PUBG, Freefire, Minecraft are using machine learning Algorithms. In several years there's been so much in the games. Games feels like real world and so many features are being developed like characters who responds to player in out-of-the-blue way [2]. Graphics are getting better and better whenever player goes near any object or texture in the game it automatically enhance it to HD. Ubisoft is also mainstreaming the machine learning in the game development. Well AI is already been using in the games but in order to reach heights and making more challenging games many

companies all over the world are giving there's day in and out to implement machine learning into the games. Using high quality of graphics and images makes games more realistic which are actually a good asset in game development [3-4].

There are many ways the machine learning is helping in the game development which are as follows:

- Complex Modelling system, to make games more realistic developers have to build more complex systems which provides real like world to the game. Some of the gaming engines are required to have complex systems for more complex games.

- Making games more pleasing, whenever player goes near any object or textures it will gives more pleasant and aesthetic look. It changes the quality of graphics automatically to render it and making environment in the game beautiful.

- Graphics, audio, videos, images are main aspect in game development and AI is helping developers to give users what they needed in their games.

Fig. 1: AI and ML in Game Development

2. AI (ARTIFICIAL INTELLIGENCE) IN GAME

There are some features and techniques to provide AI in games [5-8]:

- NPCs respond to the player unexpectedly and more uniquely and to provide it NPCs algorithm are used. It happens in the game when player is been followed or assisted by NPCs to complete a particular mission or task.

- Prediction and alteration in downstream effects are also needed in our games which can be done by modelling complex systems.

- When player goes near any object in game it will render dynamically which makes our games more pleasant. It happens because of AI as it understand that the player is going near any object and it dynamically enhance the details of it.

- In phones there are some AI chips which can be used to give power to machine learning to phone for making more engaging mobile game. Our smartphones consist some AI chips which also been used by cameras, so some of the games also uses it to provide the AI feature of the games to the player.

3. A LEARNING AGENT IN GAMES

A learning agent is the type of AI agent whose job is to learn new things from past experience and it has some learning abilities which help games to give more challenges to the player. There are other agents also which are used in AI but to develop games we use Learning agent [9].

Learning agent consist of 4 components which are:

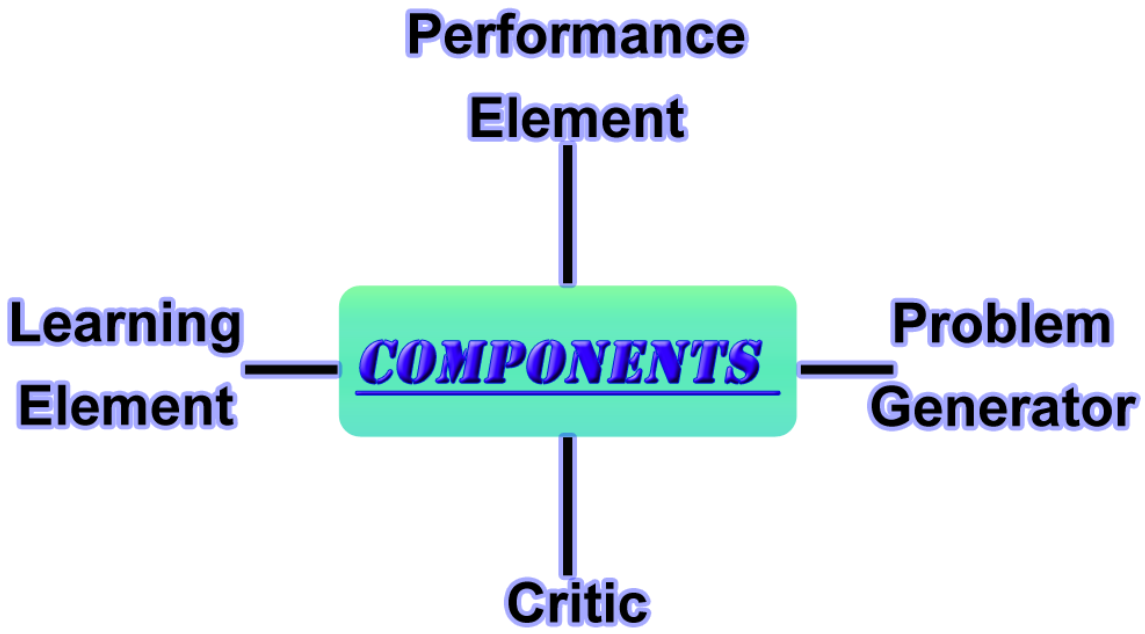

Fig. 2: Components of Learning Agent

Improvements in the games by learning from the environment, learning element is used. To describe about the game performance standards critics gives the feedback to the learning element [10]. External actions are given to the games which are handled by performance element. Well there has to be some actions which lead the game to new and informative experiences. Learning agent is actually useful in some games and without these components a learning agent will not provide the required results to the users.

4. FUTURE OF INTELLIGENCE IN GAMES

When developers started to use AI in games it was great experience for them as well as for the players too who were playing those games [11]. Machine learning in games like chess gives users more challenging experience and slowly they started to build more realistic games like Cyberpunk 2077, Far Cry 3, GTA 5, The last of us 2, and many more, which might have greater size but while playing these games it feels like real world because of Machine learning algorithms used in it which will dynamically render the objects and textures of the game [12-15].

There are some games in which another NPCs will follow us and be with us until the mission is completed no matter what and engage in fights too which helps us to win that particular mission within less time. It means AI is actually working in the background which enables NPCs to stick with the player until the mission is done. Many games have these kind of mission where NPCs help the player like Assassin's Creed Valhalla, Devil May Cry 5, GTA, Watch Dogs, Call of Duty, and many more [16].

5. ADVANTAGES

Here are some advantages of using Machine Learning in game development:

- Easily identify pattern and trends in games.
- Wide Applications for the games development.
- Continuous improvement in games accordingly.
- Handling multi-variety of data like images, characters, maps, settings, etc.

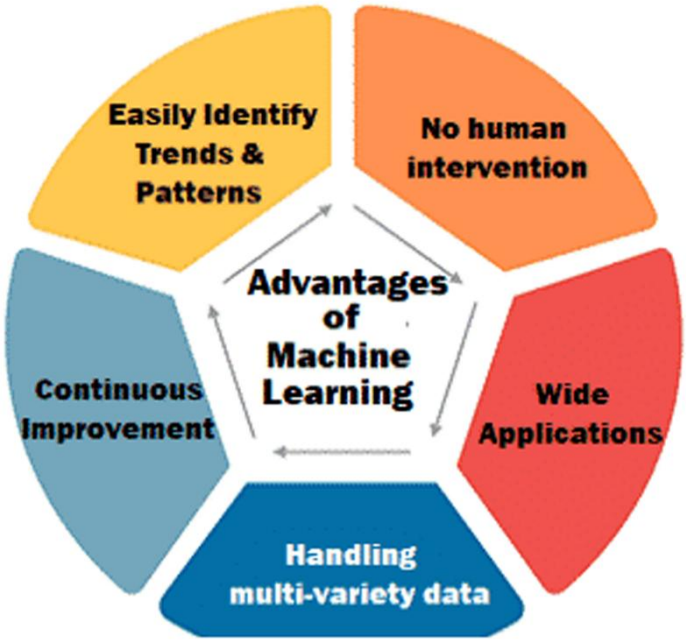

Fig. 3: Advantages of Machine Learning In Game

6. CONCLUSION

Machine learning in video games is quiet useful and it might be the future for the video games in which we can see realistic world and more capability to give us the realistic environment for players. More challenges will also occur for developers, well challenges always occurs in any industries and it is the fun part to overcome it.[5] As for game development many industries are doing their jobs to provide more to the gamers and implement AI and Machine learning.[9] In which Ubisoft is already doing their best to mainstream Machine Learning towards the game development.

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