Annotated References

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References

[Che19]   Ke Chen. Learning-based video game development in mlp@uom: An overview, 2019.

> The paper focus on applying machine learning techniques to video game development, comparing which with traditional methodologies in in Machine Learning and Perception Lab at the University of Manchester(MLP@UoM). The author overviewd learning-based procedural content generation, learning-based serious education games. fast skill capture via learning and object-based learnable agents respectively. Finally, the paper discussed these techniques and draw the conclution that human-like learnable agents with machine learning methods would be important research area in the future.

[eds17]   General video game ai: Learning from screen capture. *2017 IEEE Congress on Evolutionary Computation (CEC), Evolutionary Computation (CEC), 2017 IEEE Congress on*, page 2078, 2017.

> The article presetned a screen capture learning agent for General Video Game AI framework. It use a Deep Q-Network algorithm to develop an agent that learns to play defferent games in the frame work. It test the algorithm using various games of different categories and difficult levels. It showed the result that the learning agent is capable for learning several different games with a single learning algorithm.

[eds19]   General video game ai: A multitrack framework for evaluating
            agents, games, and content generation algorithms. *IEEE Trans-
            actions on Games, Games, IEEE Transactions on, IEEE Trans.
            Games*, (3):195, 2019.

            The article presented the General Video Game AI
            (GVGAI) and Video Game Description Language
            (VGDL). GVGAI is a framework platform where re-
            searcher can test AI algorithms through using games
            developed by VGDL. Firstly, the article introduced
            the GVGAI framework, including details about plan-
            ning settings and learning settings. Substantially, the
            article introduced the GVGAI competition tracks in-
            cluding game playing tracks and PCG tracks. Then,
            it discussed the methods for single player planning,
            including basic methods, tree search methods, evo-
            lutionary methods, hybrids, and presented the algo-
            rithm selection part. It also discussed two-player plan-
            ning methods including tree search methods, evolu-
            tionary methods and opponent model. Then meth-
            ods for single-player learning, level generation and
            rule generation were discussed. Additional, The article
            discussed educational use and future direction of the
            research. Finally, it drawed the conclusion that GV-
            GAI provide powerful tool for academic study and can
            be potentially used for game development if reaching
            higher level of maturity.

[Für10]   Johannes Fürnkranz. *Machine Learning and Game Playing*,
            pages 633–637. Springer US, Boston, MA, 2010.

            Machine learning method has been applied into game-
            playing for a long period. Video game industry has
            found game AI as an important role for entertain-
            ment and enjoyness of the game product, while com-
            puter game is successful application of AI. Games offer
            oppotunities for AI development such as simulation,
            data analysis and education. Topics about machine
            learning applying into game-playing include learning
            player and game, model learning, performance and so
            on.

[FZ17]   M. Frutos-Pascual and B. G. Zapirain. Review of the use of ai techniques in serious games: Decision making and machine learning. *IEEE Transactions on Computational Intelligence and AI in Games*, 9(2):133–152, June 2017.

> Serious game is a kind of video game which are designed for certain purposes other than enjoyment. The paper collected several relevant articles of past decade and analysed the trend of artificial intelligence method related to decision making and machine learning about serious game. The author also discussed algorithms used as well as factors of market, purpose, platform and so on. By comparing different AI techniques in several serious games, the author draw the conlusion that AI in serious game provide players with a nearly real experience and still need better method for testing.

[GCB08]   Leo Galway, Darryl Charles, and Michaela Black. Machine learning in digital games: a survey. *Artificial Intelligence Review*, 29(2):123–161, Apr 2008.

> The paper argued that machine learning techniques improve the behaviroural dynamics of computer controlled game agents, thus enhancing the capabilities of digital game artificial intelligence and providing the opportunity to create more engaging the entertaining game-play experiences and provided a survey of machine learning algorithms and methods applying in digital game. The paper presented some issues and constraints with learning in digital game environments consisting digital game environment related issues machine learning related issues and game design and development issues. Then it reviewed machine learning techniques within digital game research, which include neural network approaches to learning, evolutionary approaches and evolutionary optimisation of program-based game agent controller representations. Finally, the article drawed the conclution that academic digital game research has focused primarily on statistical machine learning tech-

niques and neural networks application in game agent development had achieved great success.

[LUWD07] Jay Lorch, Frank Uyeda, Randall C. Wood, and John (JD) Douceur. Enhancing game-server ai with distributed client computation. In *Proceedings of the 17th International Workshop on Network and Operating Systems Support for Digital Audio and Video (NOSSDAV)*, pages 31–36. Association for Computing Machinery, Inc., June 2007.

In online role-playing games, offloading AI computation from game servers may cause heavy latency. The paper present AI computation with distributed client. The mechanism split server-side AI compuatation into server-side simple high-frequency part and client-side low-frequency intensive part. The author analysed the problem of latency and evaluate the method with example of tactical navigation. It showed practical result in offloading compuatation to client-side.

[TF14] Emmett Tomai and Roberto Flores. Adapting in-game agent behavior by observation of players using learning behavior trees. In *FDG*, 2014.

The article described Learning Behavior Tree, which is an extention of a well-know games industry technique for scripting in-game agents. The paper discussed that the Learning Behavior Tree introduce more human-like variation to game decision structure by training obvervation of players rather than conventional scripted AI suffering from brittleness and lack of the natural variation seen in human players. It introduced player behavior in Multiplayer Online Role-playing Game (MMORPG) and Behavior Tree technique. Then, the article discussed learning behavior trees including adapting from player traces and modifiers and evaluated the ability of the algorithm to adapt a deterministic Behavior Tree to cover human player traces sets. Finally, it drawed the conclution that learning behavior tree is capable for making

non-deterministic decisions and varied population of agents.

[Yan12]   Geogios N. Yannakakis. Game ai revisited. In *Proceedings of the 9th Conference on Computing Frontiers*, CF '12, pages 285–292, New York, NY, USA, 2012. ACM.

The paper present four research fields on game artificial intelligence other than traditional non player character(NPC) control, consisting player experience modeling (PEM), procedural content generation (PCG), massive-scale game data mining and enhancing NPC AI. PEM construct computational models of experience of players, including subjective PEM, objective PEM, gameplay-based PEM and personalizing PEM. PCG research game content automatical generation. Data mining over massive-scale games can perform data analysis to game to evaluate game and improve game quality. AI enhancement improve the enjoyness and immersion of gameplay.