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A Study of Real Time Strategy Games Using AI

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ABSTRACT: AI challenges in the area of real time strategy games. And present a new research agenda in improving the AI performance in games. In this paper, we study how AI help to build an AI module with the level of human skills and able to challenge and beat the strong human players. We also see the designing Adaptive AI for a building a player build order. And tactical search techniques and how AI and Deep Reinforcement Learning will help to achieve the AI module to learn from experience. We also have done a public survey on RTS Games using AI.

KEYWORDS: AI, RTS, BWAPI, ORTS, MONTE-CARLO, STARCRAFT

I.INTRODUCTION

AI has open vast research field in Real Time Strategy(RTS) Games. AI has proved to be very useful in increasing the Standard of gameplay. The First RTS games started in early 1990s with title such as Warcraft, Command and Conquer. AI has helped to build games as a serious challenge to human player. Monte-Carlo based techniques emerged in field of computer games. Increased research in RTS games provide a route for exploring various complex challenges that are central to game AI and many other problems. The multiscale AI and co-operation raised problems and challenges for AI agents and most trivial for a human player. Research in AI in RTS will be useful for new RTS games. Various research studies are done in order to rectify the problems.

The aim of this paper is to study RTS games, how they developed and become more competitive and popular. We also had done survey to know the public opinion.

In this paper, we further see the Section II work related to AI in RTS games and how research help in development of AI in RTS.

Section III includes data analysis. Section IV is about Experiment (survey) done and it's result and the conclusion of this paper and Finally the Section V presents conclusion.

II.RELATED WORK

In [1] Adhikari, N. et al. investigated a multi-objective, co-operative co-evolutionary algorithm to evolve control tactics for groups composed from multiple types of units in real-time strategy games. In [2] Adil K. et al. represents the review of AI for different approaches used in real time strategy games. In [3] Bakkes S. et al aimed to generate fully automatically an evaluation function for game AI. In [4] Bamford, C. et al. represents Griddly an open-source project aimed to be a platform for grid -world based research. In [5] Barriga N. et al tried to improve RTS game AI. They present a case study of Deep Reinforcement Learning that investigates how it can use to improve game AI. In [6] Buro and Furtak described the road map and status of ORTS project and their goal to implement RTS programming environment and build AI system that can out performs human experts. In [8] Buro, M. focused on RTS games and developing it to further height. Applying planning and machine learning techniques to RTS games. In [9] Chaslot, G. et al. aimed to make a unified framework to game AI. This framework is random exploration of search space are use to predict most of the game actions. It can also be applied effectively to classic board games and video games. In [10] Churchill, D. et al focused splitting the game into strategic components and developing separate systems to solve each and also discussed architecture of UAlbertaBot and technique for including search based on AI systems for Combat scenarios. In [12] Dahllbom et al. suggested a goal directed hierarchical dynamic scripting approach for incorporating learning into RTS games. In [13] Huang and Yang introduced a effective architecture MSCNN into winner prediction. In [14] Kleiner, A. et al. focused on how robot playing football in ROBOCUP and use that technique in AI and how it can contribute to AI in computer games. In [15] Lin, Z. et al. presented STARDATA- a large dataset of StarCraft replays that contains full state data recorded every 3 frames. This enables the study of tactical and strategic elements of Starcraft gameplay at different scales. In [16] Lorthior and Inoue presented a method using simulation and Bayesian programming to infer the players strategy in a RTS games and also described it can be used to become more adaptive AI and thus making more challenging for players. In [17] Ontanon, S. summarized the set of open problems in RTS games. They tried to find efficient techniques for tackling these problems on RTS games and can thus benefit other AI



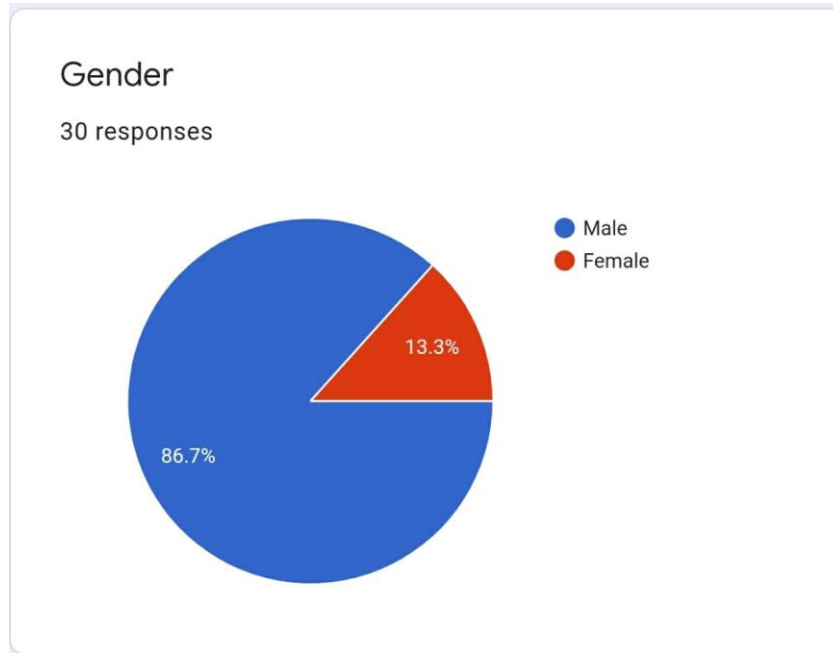
disciplines and application doamins. IN [19] Stiegler et al. showed the challenge in implementing cooperation between AI and human players. Their goal was to see how bi-directional communication withan AI can implemented in RTS.

III.METHODOLOGY

An online survey was held using Google form. The link of the Form was circulated in social media platform. The questionnaires in the form were designed to test the proposed hypothesis.

i. Participants

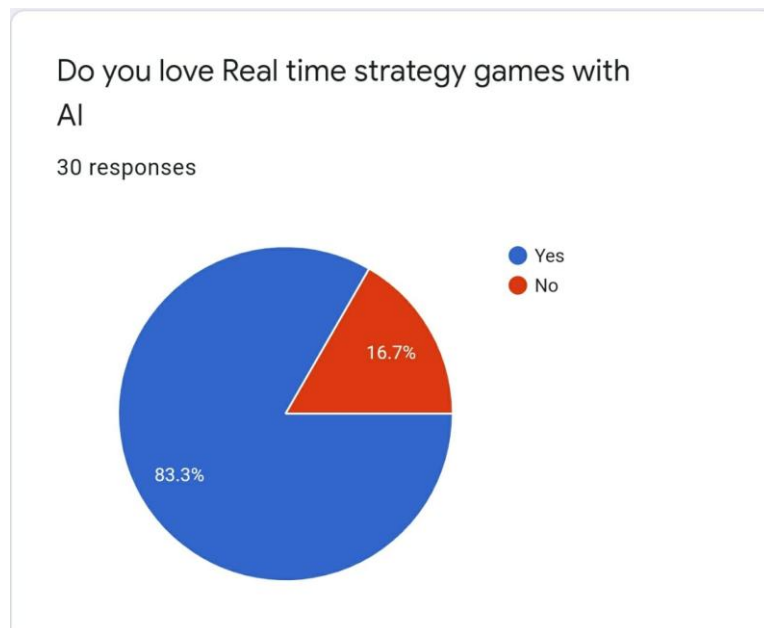
A total of 30 participants data was collected. Among 86.7%(26) where males and 13.3%(4) where females.



(a) response for gender

ii. Measures

Participants where ask to choose do they love playing RTS games using AI (yes/no).



(b) response for love of the game

IV. EXPERIMENTAL RESULT

The survey data was collected and solved by CHI SQUARE TEST with 0.05 significance level. We checked whether there is relation between Participants gender and love for games. The participants were asked questions to collect data (example, select your gender? Do you love playing RTS games?)

We choose,

Null hypothesis = There is no significance relation between gender and love for RTS games among participants.

Alternative hypothesis = there is significance relation between gender and love for RTS games among participants.

$X^2_{tabular}=0.997$, $X^2_{cal}=6.99$

The data samples were calculated using chi square test and the survey analysis resulted that males love playing AI RTS more than females. Hence, there is a significance relation between gender and love for RTS games among participants.

V. CONCLUSION

In RTS games, a user wants strong opponents to compete against. According to survey conducted people love playing RTS game with AI and want more developed AI module. Research has helped to build a strong AI. But still there's a lot to improve, solve problems and techniques. As per analysis 82% participants love playing AI-RTS games. We also got to know that people want more development in AI module for RTS games as they won't find much interesting to compete against AI module (BOT).

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