Designing Machine Learning Frameworks for Intelligence and Gamification Research

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Abstract

In the era of big data analytic, describing structural pattern in data has been the fore front of many research themes. By defining the data, machines (or computers) will be able to create information and later on transform it into knowledge. The knowledge will be stored, used, referred, postulated and reasoned with. Those activities define learning in its own specific domain and context. The more important thing, however, is how beneficial these activities are to humans. The end product of learning that could establish the relationships between knowledge and intelligence.Better knowledge produces good performance which will gradually enable a system to make intelligent decisions. The central part of this subject is described in terms of frameworks or algorithms that explains how to achieve better performance. These are the main issues being explored and discussed in this research. As artificial intelligence (AI) is a very wide subject, two specific areas are chosen to illustrate the practical usage of machine learning frameworks.For the first part, intelligence embedded system has been utilised to improve performance and ,secondly, tackling the issues in games and gamification technology. Machine learning frameworks have been utilised to facilitate intelligence as operational mechanism in intelligence embedded system such as learning system, prediction protocol and robot navigation system. A concept learning program (DeJong) is presented with both a description of the feature space and a set of correctly classified examples of the concepts, and is expected to generate a reasonably accurate description of the unknown concepts. Nordin & Faridah (2015) devised genetic framework to predict the strength of medium density fibreboard to skip some of the strength tests. Hagras et al. formulated Fuzzy-Genetic technique to adapt the learning behaviour of an autonomous mobile robot in unstructured and changing environments.

Gamification is a term used to describe the use of games and games technology in an application. It includes fundamental research on games as explained in this report.Genetic based framework has been successfully used in gamification technology as reported in Nagatsuka, K. et al (2014) when he used genetic based machine learning algorithm to break ties in chess and Nordin & Fadzil(2012) for using genetic algorithm in designing Sudoku grids.The unique Game Refinement Theory (Iida, H.) was utilised to measure the uncertainty of game outcome. It attempts to provide measurability of human perception towards winning the game such as entertainment level, emotional scales and the strive to reach the end of a game with a positive outcome.Game refinement theory has identified game patterns,the game progress curve, evaluation of players' winning-ness or losing-ness as well as games fairness, evolution and design. The game refinement values are used to facilitate the interpretation and analysis in many of

those game refinement theory's applications.

The ultimate goal of these research works is to find and define intelligence as a complex collective behaviour, sophisticated information processing and adaptation via learning or self-organising behaviours. Machine learning frameworks give a practical foundation to achieve this goal and redefine intelligence embedded system and gamification technology.

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