Historical Developments: AI Planning and Search

Artificial Intelligence Nanodegree, Udacity

Introduction

The idea of being able to teach non-human, physical entities to think and make them 'intelligent' has had its roots reaching far back in the history of mankind, in thoughts pertaining to mechanical men, Aristotle's methods of logical thought and so on. However, the formal beginnings of the field of 'Artificial Intelligence' was in 1956, at a conference at Dartmouth College, in Hanover, New Hampshire. Elaborated below, are three noteworthy developments in the field of Artificial Intelligence, specifically related to Planning and Search.

General Problem Solver, 1959

General Problem Solver or GPS was the first computer program that attempted for 'General Intelligence' by separating the knowledge of problems from the strategy to solve the problems. Created by Herbert A. Simon, J. C. Shaw and Allen Newell, the GPS was implemented in a third-order programming language called IPL. [Wikipedia[2]] Even though, GPS only ever managed to solve "well-defined" problems, it laid the grounds for other theoretical work fundamental to model cognition.

Partial Order Planning, 1975

Partial Order Planning functioned on the Principle of Least Commitment, which made it an efficient system. It was an approach to automated planning that left decisions about the ordering of actions as open as possible, that is, given a problem which required a sequence of actions to reach a goal, a partial order plan specified all the actions needed to be taken, but the ordering of the actions, only when required. [Wikipedia[4]] It contrasted from the the previously developed system of total-order planning, which produces an exact ordering of actions, searching among search states. This technique was developed by Earl Sacerdoti in his NOAH system.

Graphplan, 1995

The Graphplan Algorithm was developed in 1995, by Avrim Blum and Merrick Furst. It differed from the previous paradigm of partial order planning algorithms. [Wikipedia[5]] The algorithm used a novel planning graph to reduce the amount of search needed to find a solution. In a Graphplan planning graph, the nodes were actions and atomic factors, arranged into alternate levels and edges were of two kinds - from an atomic fact to the actions for which it is a condition, and from an action to the atomic facts it makes true or false. The approach was much faster than the existing traditional approaches to planning in AI and this led the research community to look at techniques outside the traditional AI planning toolbox [Rinaten, Hoffman[6]].

References:

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