Study on the Fundamentals and Foundations of Artificial Intelligence

Suprana Roy[1] and Kajal Yadav[2]
Assistant Professor, BSC CS, Suman Education Society's LN College, Borivali East, Mumbai, India[1]
Student, BSC CS, Suman Education Society's LN College, Borivali East, Mumbai, India[2]

Abstract: *Research in artificial intelligence draws on tools and techniques from various disciplines, including formal logic, probability theory, decision theory, management science, linguistics, and philosophy. On the other hand, using these areas in AI required the development of some modifications and extensions. The computational logic approach is one of the most powerful of them. We argue that when embedded in the agent cycle, computer logic integrates and improves upon both traditional logic and classical decision theory. We also propose that many of its principles can help individuals develop human intelligence without the aid of computers, not just AI.*

Keywords: *Artificial Intelligence*.

I. INTRODUCTION

Computational logic, like other types of logic, comes in a variety of flavours. In this work, I will concentrate on the computational logic form known as abductive logic programming (ALP). I will propose that the ALP agent model, which incorporates ALP into an agent cycle, is an effective model of both descriptive and normative reasoning. It covers production systems as a specific case as a descriptive model, and as a normative model, it contains classical logic and is consistent with classical decision theory. The ALP agent model's descriptive and normative qualities make it a dual process theory that blends intuitive and deliberative reasoning. Dual process theories, like most theories, take numerous forms. put it, intuitive thinking "quickly provides intuitive answers to judgement issues as they emerge", whereas deliberative thinking "monitors the quality of these recommendations, which it may approve, correct, or veto". [1]

In this paper, I will focus on the normative elements of the ALP agent model and how they might help us better our own human thinking and conduct. I'll concentrate on how it may help us interact more effectively with others and make better decisions in our daily lives. I shall argue that it provides a theoretical foundation for both such English writing style rules.

II. A BRIEF OVERVIEW OF ALP AGENTS

The ALP agent model is a variation on the BDI model in which agents utilise their beliefs to meet their desires by producing intentions, which are predetermined plans of action. Agents, beliefs, and wants (or objectives) are all expressed as conditionals in the clausal form of logic in ALP. Beliefs are expressed by logic programming clauses, and aims by more broad clauses, both with the expressive capacity of complete first-order logic (FOL). The first statement below, for example, represents a purpose, whereas the last four words express beliefs: [5] Goals are written conditions first in this article because, like production rules, they are always utilised to reason onward. Beliefs are frequently expressed with the conclusion first, because they, like logic programmes, are used to reason backwards. However, beliefs are commonly presented as conditions first since they may be used to reason backwards or forwards in ALP. It makes no difference in semantics whether conditionals of any sort are expressed forwards or backwards.

2.1 Model-theoretic and Operational Semantics

In the semantics of ALP agents, beliefs represent the world as the agent perceives it, whereas goals describe the world as the agent wishes it to be. Beliefs represent data in deductive data-bases, whereas objectives represent data-base queries and integrity restrictions.

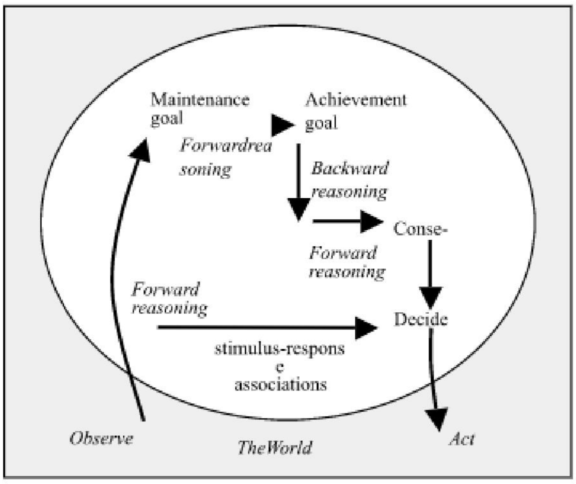

Figure1.The basic AL Pagent cycle

According to the operational semantics, ALP agents reason forwards from observations and backwards from beliefs to determine if an instance of a goal's precondition is true, and to derive the matching instance of the goal's conclusion as an accomplishment goal, to make true. Forward reasoning from observations is similar to forward chaining in production systems in that it aims to make the objective real by making its conclusion true whenever its precondition become true. Conditional objectives defined in this manner are often known as maintenance goals. [2] Goals are solved by thinking backwards, looking for a plan of action whose implementation solves the goals. Backwards reasoning is a type of goal-reduction strategy, and executable actions are a subset of atomic sub-goals.

Consider the following scenario: I notice a fire. I may then reason using the above-mentioned aim and beliefs, concluding through forward reasoning that there is an emergency and deriving the accomplishment goal of dealing with it myself, getting help, or escaping. These three options mark the beginning of the search space. By thinking backward, I can solve the attainment target.

Lowering the target I receive assistance with the subsequent sub-goals. I notify the train's driver and hit the alarm button. If the last sub-goal is an atomic action, it can be carried out directly. If the activity is successful, both the accomplishment objective and this occurrence of the maintenance goal are met.

In model-theoretic semantics, the agent must create not just actions, but also world assumptions. These assumptions explain why the word ab-duction is used in ALP. Abduction is the process of developing hypotheses to explain observations O. For example, instead of watching fire, I can notice smoke and conclude: there is smoke if there is a fire. The observation is then used to produce the assumption that there is a fire. The forward and backward reasoning then resumes as before.

Observations O and goals G are treated similarly in model-theoretic and operational semantics, with reasoning forwards and backwards to create actions and other assumptions that make G O true in them in the world model given by B. In the above example, assuming O=there is smoke, then=there is a fire, pressing the alarm button combined with B makes both G and O true. Theoperationalsemanticsissoundwithrespecttothemodel-theoreticsemantics. It is also comprehensive with modest assumptions.