

Towards Building a Humanoid Robot Using a Pyramid of Needs in Real Time

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ABSTRACT

This article considers a humanoid robot to be a robot that behaves like a human being; it approaches behavior as a process of satisfaction of needs. Needs generate desires that strengthen with their dissatisfaction and weaken with satisfaction. The stronger the desire, the more attention is paid to it by the desiring subject. The strongest at the moment desire gets in the center of attention of a subject and has the highest probability of being acted upon. After the need is satisfied, its desire weakens, loses its dominant position, and the next strongest need becomes the center of attention. This article presents a dynamic, hierarchical table depicting the needs satisfaction process in real time that can serve as a conceptual blueprint for building a humanoid robot. The author also proposes a version of this table utilizing his mathematical models of attention, attitude/belief, desire, need, and will effort.

INTRODUCTION

What Does It Mean for a Robot to Be Humanoid?

In order to understand how to build a humanoid robot, one first of all, has to define what it means for a robot to be humanoid. One answer to this question is that it is the robot that behaves like a human being. This answer begs a question - what is behavior? Arguably, one of the most productive ways of analysis and explanation of behavior is through addressing the process of needs satisfaction, because it constitutes the bulk of behavior in its entirety. It is widely accepted that behavior of animals and humans alike is driven by satisfaction of their needs. According to Cabanac (2000), "One basic postulate of Ethology is that behavior tends to satisfy the most urgent need of the behaving subject" (p. 1). Hence, the author will define and approach behavior of a subject here as a process of satisfaction of this subject's needs.

What are the main facets of this process? Needs generate desires that strengthen with their dissatisfaction and weaken with satisfaction. The stronger the desire, the more attention is paid to it by the desiring

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subject. At any moment, animal and human subjects have multiple needs, represented by their desires of different strength. The strongest desire gets in the center of attention of a subject, and has the highest probability of being acted upon. After the need is satisfied, its desire weakens, loses its dominant position in the hierarchy of needs/desires strength, and the next strongest need gets in the center of attention of a subject. Isolation of a desire, its objects and ways of satisfaction in the center of attention allows a subject to form positive or negative, stronger or weaker attitudes to them. Will effort can suppress or support desires, affect their strength and, therefore, can put these desires and acts of their satisfaction in and out of the center of attention of a subject; it can also adjust involved attitudes. This paper presents a dynamic, hierarchical table depicting the needs satisfaction process in real time. The author also proposes a version of this table utilizing his mathematical models of attention, attitude/belief, desire, need, and will effort. This table can serve as a conceptual blueprint for building a humanoid robot.

BACKGROUND

Maslow's Pyramid of Needs¹

Maslow's pyramid represents the basic composition of human needs. The pyramid itself is static, it says nothing about prioritization of needs of a subject in real time. However, Maslow (1943) saw needs satisfaction as a dynamic, ever changing process of prioritization and re-prioritization of needs:

These basic goals are related to each other, being arranged in a hierarchy of prepotency. This means that the most prepotent goal will monopolize consciousness and will tend of itself to organize the recruitment of the various capacities of the organism. The less prepotent needs are minimized, even forgotten or denied. But when a need is fairly well satisfied, the next prepotent ('higher') need emerges, in turn to dominate the conscious life and to serve as the center of organization of behavior, since gratified needs are not active motivators. Thus man is a perpetually wanting animal. (p. 394)

The hierarchy principle is usually empirically observed in terms of increasing percentages of non-satisfaction as we go up the hierarchy. (p. 395)

The important questions are:

- how does nature “urge” a subject to satisfy a need (see Cabanac's quote above); what is the mechanism of the need's pressuring a subject towards acts of its satisfaction;
- what determines Maslow's 'prepotency' of a need and its 'percentage of non-satisfaction';
- how does a need become the most “prepotent”, “the most urgent” first priority, the utmost “active motivator”?

FOCUS OF THE CHAPTER

Needs Satisfaction Process

The author believes that the answer to these questions lays in the understanding of the interaction between needs, desires, attitudes, beliefs, attention, and will effort. Their relationships are revealed by

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