A Bayesian Approach To Task Prioritization

Project Proposal
Sarah Curry
23.10.2016

Introduction

This model addresses the challenge of prioritizing tasks when there are multiple goals that may conflict with each other. Humans routinely deal with this challenge in a variety of unique ways that depend on the individual's preferences, which are rarely quantified. Not only are these prioritization schemes unquantified, but they are also subject to the emotions that can sway an individual to make illogical decisions. Although the human challenge of deciding what to do at this moment is far more complex than optimizing goals, this work seeks to develop a model for a purely logical task prioritization scheme.

 The objective of this model is to quantify an optimal strategy for deciding which tasks (steps toward a goal) to prioritize / how humans make decisions about progressing toward multiple goals simultaneously.

Representing Task Prioritization Using A Bayesian Network

Human goals cover a range of things from long term academic achievements (such as earning a master's degree) to happiness in the form of enjoying the current moment and a feeling of satisfaction with achievements. Deciding how to progress toward these goals is an ongoing cycle of deciding what to do now, or in the short term future. This decision is based broadly on 2 things: 1) how the individual feels, and 2) which goal is most important / the ranking of the goals.

The first thing - how the user feels - is a complex array of factors including physical needs such as sleepiness and hunger, and general mood. The second item - ranking the goals - is a simpler problem.

Given multiple, conflicting goals, the decision of which task to prioritize is highly dependent on the how the individual feels - his/her current state. This complex set of relationships between the individual's current level of sleepiness, hunger, happiness, etc. and her decision of which task to prioritize can be represented with a Bayesian Network, which handles these conditional dependencies.

Using data provided by an individual about which tasks resulted in the highest level of progress toward the goals, this model will generate a list of tasks in order of the probability of the highest progress towards goals.

Research Question

This model seeks to determine an optimal balance of time devoted to achieving a set of goals for a given individual. When compared with how the individual actually spends her time, can we determine a pattern to the state of the system (the individual's state and the tasks deemed to be highest priority) when the individual's selected task matches the model's recommended task?

Research Methods

Data regarding an individual's current state and activities will be collected. These data shall be used to train the Bayesian Network. Metrics for assessing productivity toward goals shall be assessed separately for each goal.

Resources

Priority based Dynamic Multiple Robot Path Planning
https://opus.lib.uts.edu.au/bitstream/10453/7082/1/2004001652.pdf

Culture Matters When Designing a Successful Happiness-Increasing Activity

Hedonometer Project: http://hedonometer.org/index.html