Value-Based Prioritization*

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Abstract

A method is proposed to use value theory to quantitatively prioritize potential actions to accomplish a goal. This method is applied to the example of choosing meaningful work using an example value system based on the desire to reduce suffering.

1 Introduction

Why should a particular goal be pursued ("Why")? Given a goal, what actions should be pursued to best accomplish said goal ("What")? Given an action, how should said action be pursued ("How")?

This article proposes that value theory usually best scopes "Why" and "What" and the scientific method usually best answers "How". A method called Value-Based Prioritization (1) is developed to answer the "What" question:

$$\begin{array}{c} \text{Why: } \textit{Value Theory} \\ \downarrow \\ \text{What: } \boldsymbol{\textit{Value-Based Prioritization}} \\ \downarrow \\ \text{How: } \textit{Scientific Method} \end{array} \quad (1)$$

2 Why a Goal?

"Why a Goal?" is usually best scoped using a value system because value systems are evaluative by nature[11]. Evaluating different value systems is left as an (lifelong) exercise for the reader[i].

3 What Actions?

"What Actions?" is usually best scoped by prioritizing actions because actions usually have differing effect sizes and time is limited. It follows from the value system used to answer "Why" that the same value system is used primarily to evaluate the priority of each action.

This article proposes a method called Value-Based Prioritization which builds a quantitative prioritization model based on predicted effect sizes. Raw prioritization scores are further scaled by contextual factors such as implementation time, cost, risk, and other judgments.

4 How to do an Action?

Given answers to "Why?" and "What?", how to implement actions is usually best answered

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[i]Example value systems include intuitionism[7], consequentialism[12], evolutionary biology[5], religion[6], epicureanism[9], stoicism[3], political liberalism[14], anarcho-capitalism[8], communitarianism[4], objectivism[2], etc.

with the scientific method[1]: observations are made and rational thought is used to generate hypotheses, hypotheses are tested with experiments, and successful experiments lead to theories and results.

5 Value-Based Prioritization

A **value system** V (2) generates a **goal** $G(t)$ (3) (for some future time t) and a set of **mutually exclusive potential future actions** $A(t)$:

$$A(t) = \{A_1(t), \ldots, A_N(t)\}, \quad N > 1 \tag{4}$$

An action's **estimated relative accomplishment amount** $B(A(t))$ is an action's expected *relative* (i.e. with respect to other actions) contribution towards accomplishing G(t):

$$B(A(t)) = \mathbb{R}, \quad 0 \leq \mathbb{R} \leq 1 \tag{5}$$

Thus, $G(t)$ is fully accomplished if all actions are accomplished:

$$G(t) = \sum_{i=1}^{N} B(A_i(t)) = 1 \tag{6}$$

A **value-based prioritization score** $C(A(t))$ is the result of the product of a set of **value-based prioritization scale functions** $S = \{S_1, \ldots, S_N\}$ (7) multiplied by (5):

$$C(A(t)) = B(A(t)) \cdot \prod_{j=1}^{N} S_j(A(t)), \quad 0 \leq S_j(B(A(t))) \leq 1 \tag{8}$$

Example scale functions include implementation time, cost, risk, and other judgments. Ideally, scale functions should be defined before running the model to reduce bias. The set S always includes the element $S_0(A(t)) = 1$. Note that $\sum_{i=1}^{N} C(A_i(t)) \neq G$ if any $S_j(A_i(t)) < 1$.

A **value-based prioritization** $Z(t)$ is a sequence of actions ordered by prioritization score (8) in descending order:

$$Z(t) = (A_1(t), \ldots, A_N(t)), \quad C(A_1(t)) \geq \ldots \geq C(A_N(t)) \tag{9}$$

The first k actions in $Z(t)$ should be executed in descending priority/proportion where k (10) is chosen based on factors such as available concurrency, time, resources, etc.

6 Modeled Value-Based Prioritization

Historical data may be used to predict actions' estimated relative accomplishment amounts (5) at a future time t_F (11) (e.g. the average time actions will take to ramp up implementation).

If each action has historical data $D(A)$ (12):

$$D(A) = ((t_1, D(A, t_1)), \ldots, (t_N, D(A, t_N))) \tag{12}$$

Then, a set of **comparable prediction models** $R(D(A))$ (13) is applied to each $D(A)$ (e.g. linear regression with different degrees):

$$R(D(A)) = \{R_1(D(A)), \ldots, R_N(D(A))\} \tag{13}$$

The models are compared using **model selection**[15,16] $L(R(D(A)))$ (14) (e.g. adjusted r^2, AIC, ANOVA, cross-validation, etc.) and the **best fitting model** $M(R(D(A)))$ is selected. Note that $M(R(D(A)))$ may be different for each action.

Next, the model $M(R(D(A)))$ is used to predict each $B(A(t_F))$.

Finally, value-based prioritization (9) is run with $Z(t_F)$.

7 Choosing Meaningful Work

Applying modeled value based prioritization to the example of choosing meaningful work, we first outline the parameters:

- (2) V = a value system which answers "Why work?" with "To reduce suffering" where suffering is defined as maximal human suffering: death. Alternatives include disease burden (e.g. Quality-Adjusted Life Years[13]), non-human suffering, etc.
- (3) $G(t)$ = eliminate human death.
- (4) $A(t)$ = the set of actions to eliminate human death for each cause.
- (10) $k = 2$ for a single person, weighted heavily on the first item with the second item being a hedge or volunteer activity.
- (11) t_F = 5 years; a normal amount of time to switch careers to work on some subset of $A(t)$ (including learning, certification, building experience, networking, etc.).
- (12) $D(A)$ = time-series data on human death by cause.
- (13) $R(D(A))$ = linear regression with one, two, and three degrees.
- (14) $L(R(D(A)))$ = adjusted r^2.

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