Automatically Providing Action Plans Helps People Complete Tasks

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Abstract

People complete tasks more quickly when they have concrete plans, especially for open-ended, creative tasks. However, people often fail to create such action plans. (How) can systems provide people with these concrete steps automatically? To scalably provide personalized action plans, this paper introduces and evaluates crowdsourcing and peer approaches for creating plans, and NLP techniques for reusing them. We evaluated the effects of action plans on different types of tasks. A between-subjects experiment found that people who received crowd-created plans completed more tasks than people asked to self-create plans and than a control group without action plans. We found that crowd-created action plans are especially effective for lingering and high-level tasks. A second experiment found that peer-provided plans led to more completed tasks than no plans. A third experiment found that participants who received re-used action plans also completed more tasks than a control group without action plans. We have incorporated these principles into TaskGenies: a crowd-powered task management system.

Introduction

People complete tasks faster when they develop concrete implementation intentions (Gollwitzer 1996, Leventhal 1965). For example, an experiment presented students with the benefits of getting a flu vaccination shot (Milkman 2011). Students in one condition were asked to make a concrete plan for when and how they would get the shot; students in the Control condition did not make such plans. The planning group followed through and got the shot much more often. This benefit could arise from the *availability* of an action plan (regardless of source) and/or the process of *contemplating* a plan oneself.

Auto-Provided Plans Increase Completion Rate

The primary shortcoming of self-created action plans is that people do not do it. Making specific, concrete plans is

> **John enters into his task list:**
> - Exercise more frequently
>
> **TaskGenies responds with the action plan:**
> - Find a workout buddy to keep you accountable
> - Get a gym membership
> - Create a weekly exercise schedule
> - Start working out this Monday and stick to the schedule

Figure 1: Decomposing people's tasks to concrete steps (action plans) makes high-level tasks more actionable. This way, tasks linger less and people complete more of them. Online crowds can create new plans, algorithms can identify and reuse existing ones.

often mentally taxing, time consuming, and not "actual" work. These factors dissuade from planning, which in turn leaves thorny, inactionable tasks that linger.

Automatically providing plans (see Figure 1), if possible, removes the barriers of self-creation. This could potentially help people to focus on execution and work more effectively.

Is it realistic to ask crowdsourced workers to provide action plans? This paper hypothesizes that yes, crowd-created action plans can be relevant, useful, and help people complete more tasks. We hypothesize that, in some cases, an automatically provided plan will get people to an actionable state with higher probability and less effort than if they were left to their own devices. In other cases, action plans may provide tactics or insight that people lack on their own. And in other cases, an automatically provided plan may not be relevant, useful, or action inducing. Not every suggestion needs to be helpful in order for the entire system to be helpful. If a majority of suggestions is valuable, people may reasonably ignore irrelevant plans.

Main Hypothesis: *Automatically providing action plans helps people complete more tasks.*

This paper compared participants' task completion rates in three between-subjects experiments that collectively compare crowd-, peer-, and self-production; recycling plans, and a control without explicit planning prompts.
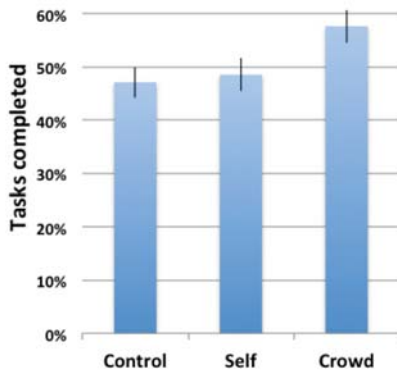
Figure 2: Participants in the Crowd completed significantly more tasks than those in the Control and Self conditions. Error bars indicate 95% CI.

Action Plans can be Reused for Multiple People

Creating new action plans for every task seems wasteful and costly, especially when tasks are similar or repeat. Reusing action plans across people's similar tasks might be an effective alternative. But would such recycled action plans be helpful to people? It is possible that the benefits of action plans arise from being custom-created for every task. This paper hypothesizes that tasks can be sufficiently similar to reuse action plans across people. These recycled action plans help people complete more tasks.

Reusability Hypothesis: *The same action plan can help multiple people complete similar tasks.*

This study compared the average task completion rates of participants in the Recycle and the Control condition. The system's NLP algorithm determined task-similarity.

Evaluation

To test these hypotheses on providing action plans, we performed three between-subjects experiments.

The first experiment compared task completion rates between a *Crowd* group in which participants were provided with action plans from anonymous crowd workers, and a *Control* group that was not suggested to create action plans. To reduce bias of this setup, we also compared it to a third group of people who were explicitly asked to create action plans on their own (*Self* condition). We found that participants in the Crowd condition completed significantly more tasks than those in the Control and Self conditions (see Figure 2). Analyzing completion rates of different types of tasks we found that providing action plans helps people more with high-level than small & well defines tasks. We also found that action plans were particularly effective with lingering tasks.

To understand whether list users will also be content creators, a second between-subjects experiment compared participants who created action plans for each other (*Peer*) against a Control group. This experiment found that Peer condition participants significantly outperformed the ones in Control condition. However, on average, participants contributed fewer plans than the number of plans received.

The third experiment investigated further workload reductions by algorithmically reusing existing action plans. For a *Recycle* condition, we designed an algorithm that selected the action plan based on the similarity of a given task against a corpus of tasks with existing action plans. Participant completion rates in the Recycle condition were found to significantly outperform those of a Control group. The results of the Peer and Recycle experiments show how the system can scale for a large number of people.

The TaskGenies System

To conduct the experiments, we built TaskGenies, a crowd-powered task management system, which evolved with the learnings of this study. There were two primary technical challenges of this system: first, to design an example-based suggestion interface, that enables crowd workers to produce good action plans; second, to create and calibrate an NLP algorithm that accurately processes the often grammatically incorrect task titles. Users manage their task lists through a mobile or web interface. The system automatically provides users with action plans upon request or when tasks linger.

Conclusion

The contributions of this work are summarized as follows:

Providing action plans helps people complete more tasks. Action plans help people especially with high-level and lingering tasks. Action plans are helpful even when reused across different people with similar tasks.

Crowdsourcing is an effective way to create action plans, as shown by a method and system we created.

We introduce a technique for successfully scaling this approach through a combination of peer-produced action plans and NLP-based reuse.

We recommend that task management systems should automatically provide action plans to their users and we demonstrate the first system that accomplishes this.

References

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