The Smartphone Domain

Pascal Bercher[1,*] and **Susanne Biundo**[2] and **Bernd Schattenberg**[3,*]
[1] The Australian National University, Australia, pascal.bercher@anu.edu.au
[2] Institute of Artificial Intelligence, Ulm University, Germany, susanne.biundo@uni-ulm.de
[3] 3B intelligent solutions, Germany, schattenberg@3b-intelligent-solutions.com
[*] The domain was created while still being at the Institute of Artificial Intelligence of Ulm University, Germany
The domain was written by Bastian Seegebarth, formerly at Ulm University. Authors are ordered alphabetically.

Abstract

This extended abstract is about the Smartphone domain, submitted as a benchmark domain to the IPC 2020.

The Smartphone Model

Companion Technology (Biundo and Wendemuth 2016; 2017) enables every-day technical systems to become really user-friendly – those companion systems adapt their functionality to the individual user's current situation, emotional state, and needs. Companion Technology involves various scientific disciplines (Biundo et al. 2016), and AI planning plays a key role as it allows a goal-directed behavior of systems and provides many further user-centered technologies, such as plan explanations (Bercher et al. 2017).

In earlier work we described how AI planning can be used to enhance the operation of a Smartphone (Biundo et al. 2011). Fig. 1 illustrates some of the menus of the (actual) smartphone that was modeled. There, we already described excerpts of the model, such as parts of the sort and task hierarchy. The actual working model was, however, created later on by our former colleague Bastian Seegebarth under the supervision of Bernd Schattenberg. The model allows to carry out various standard tasks done regularly, such as sending messages (via various means like SMS or email), attaching pictures, creating new and deleting contacts, etc.

The original model (also available in the respective repository) was written for a *hybrid* planning formalism (Biundo and Schattenberg 2001; Schattenberg 2009; Bercher et al. 2016), which fuses Hierarchical Task Network (HTN) planning with Partial Order Causal Link (POCL) planning. That model also used state abstraction axioms that define a hierarchy on state features, to be exploited for preconditions and effects of abstract tasks. For the submission to the IPC, all these "hybrid" features were stripped away, resulting into a pure HTN model. The model is cyclic and partially ordered.

The domain ended up not being selected for the IPC, because only seven problem instances were modeled, and no random generator for further instances was provided. All domains for the IPC feature 30 problem instances, but modeling further instances by hand turned out to be too hard due to the complex structure of the model.

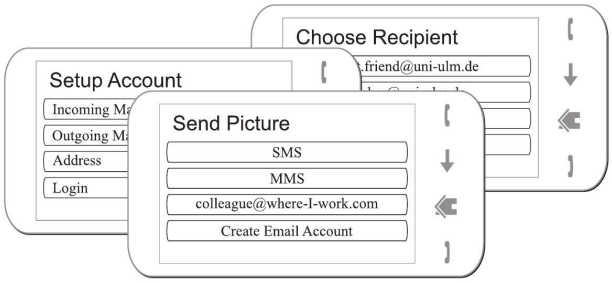

Figure 1: Illustration of the Smartphone that was modeled.

References

Bercher, P.; Höller, D.; Behnke, G.; and Biundo, S. 2016. More than a name? On implications of preconditions and effects of compound HTN planning tasks. In *ECAI*, 225–233. IOS Press.

Bercher, P.; Höller, D.; Behnke, G.; and Biundo, S. 2017. User-centered planning. In Biundo, S., and Wendemuth, A., eds., *Companion Technology – A Paradigm Shift in Human-Technology Interaction*, Cognitive Technologies. Springer. chapter 5, 79–100.

Biundo, S., and Schattenberg, B. 2001. From abstract crisis to concrete relief – a preliminary report on combining state abstraction and HTN planning. In *ECP*, 157–168. AAAI.

Biundo, S., and Wendemuth, A. 2016. *Companion*-technology for cognitive technical systems. *Künstliche Intelligenz* 30(1):71–75. doi: 10.1007/s13218-015-0414-8.

Biundo, S., and Wendemuth, A., eds. 2017. *Companion Technology – A Paradigm Shift in Human-Technology Interaction*. Cognitive Technologies. Springer.

Biundo, S.; Bercher, P.; Geier, T.; Müller, F.; and Schattenberg, B. 2011. Advanced user assistance based on AI planning. *Cognitive Systems Research* 12(3-4):219–236.

Biundo, S.; Höller, D.; Schattenberg, B.; and Bercher, P. 2016. Companion-technology: An overview. *Künstliche Intelligenz* 30(1):11–20.

Schattenberg, B. 2009. *Hybrid Planning & Scheduling*. Ph.D. Dissertation, Ulm University, Germany.