Title: **Scaffolding Approach towards Designing Beginner-friendly Toolkits**

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Abstract:

Scaffolding refers to the temporary structure that is used to support workers and materials in the construction, maintenance and repair of buildings or any other artificial structure. In the educational domain, the term scaffolding has traditionally been used to refer to the process by which a teacher or more knowledgeable peer assists a learner. A typical example is that the teacher can alter learning tasks when necessary so that the learners can solve problems that would otherwise be out of their reach. Different from the traditional views, the recent version of scaffolding on interactive learning environment has referred to ways that the software itself can scaffold learners rather than only knowledgeable peers. These approaches are mostly presented in the context of science querying and learning to facilitate the interaction between learners and more knowledgeable peers.

Given the fact that beginners are also learners of toolkits, we aim to take an educational perspective, differing from the conventional views of UX and usability methods, to develop beginner-friendly toolkits. From the educational literature, we find out providing scaffolding support is a critical component in teaching or learning new tasks, especially involving multiple and complex processes. Therefore, the thesis aims to transfer and re-develop the scaffolding philosophies to designing beginner-friendly toolkits.

First of all, the thesis summarises the scaffolding philosophies from the educational domain and develops three scaffolding methods: 1) Scaffolding process management; 2) Scaffolding sense-making; 3) Scaffolding integration. Secondly, the thesis designs and implements three toolkits NexP, MapVideo and WADE (NexP is an open-source toolkit for designing and running controlled experiments in HCI; MapVideo allows the creation and use of interactive concept maps as navigation and learning aid for educational videos; WADE simplifies the modification of the interface and functionality of existing third-party software without access to source code). They adopt the three scaffolding methods and assist beginners to address a HCI related problem. Finally, the thesis evaluates the three toolkits against state-of-the-art approaches in various user studies. Results demonstrate that beginners???
performances are significantly improved via using the scaffolding supports. Finally, the thesis provides a high-level discussion on adopting scaffolding to designing other applications.