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Designing a Creative Assistant of a Designer

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Abstract

This article describes a model of the future software system, the main task of which is to provide assistance in coloring graphical user interfaces (GUI). The functioning of the system is based on semantic map data. Elements of this semantic map are individual colors and combinations of colors, associated with functional elements of the interface. The map coordinates of each individual color or combination are derived from emotional assessments by human participants. The usage of the map is based on patterns and schemas, typical for popular GUI designs. A system of this sort will be useful as a creative assistant to a human designer in various design projects and in design education.

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1 Introduction

Near-future autonomous robots and intelligent agents (collectively called actors), as well as physical and virtual co-robots and personal assistants (collectively called Cobots), are expected to work side-by-side with humans [4-6,9]. They will interact with humans either in a team or one-on-one individually, either as equal partners (that should be perceived as individual Selves [7]) or as seamless extensions of human minds and bodies. An obstacle to social acceptance of artifacts at this level include the lack of socio-emotional, narrative and commonsense intelligence and human-level learning abilities [1]. This is the huge gap separating natural and artificial intelligence (AI). Yet, the very question of the role of socio-emotional intelligence in successful collaboration between an artifact and a human remains open [11]. The problem is compounded by the lack of generally-accepted, universal theoretical model of socio-emotional intelligence that may guide the design of actors and Cobots for practical domains.

Partially addressing the outlined general problem, here we develop an approach to designing a creative assistant of an artist-designer, using the domain of graphical user interface (GUI) design as a testbed problem. The creative assistant helps a designer to choose colors for an interface according to the semantic map [10]. To simplify consideration of the creative assistant's operation, we assume that the geometry of the interface is preset and fixed.

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It is important to choose an operating mode of the creative assistant and potential coloring patterns (represented by schemas in the assistant) for interfaces which it will follow.

The creative assistant will operate systematically, according to one of the following two modes:

1. Serial mode, when the creative assistant complements the user's work at each even-numbered step (so the assistant chooses colors for some interface elements according to the colors specified in the previous steps and providing partial free choice for the user);
2. Assistant-adviser mode when the assistant offers the user to choose the color from the limited number of colors at every step. These colors are chosen considering their relevance to the color palette of the interface. Also the user may reject the proposed colors and choose the color from the whole color palette.

The coloring patterns for interfaces may differ according to the contrast and the number of colors in them. For example, interfaces may have contrasting colors – light colors in a dark background or dark colors in a light background or vice versa, soft colors – dark colors in a dark background, light colors in a light background.

In its operation the assistant shall determine a coloring pattern for an interface, which was implicitly chosen by the user, and support it, supplementing the coloring started by the user or correcting possible errors in coloring.

2 Methods

Participants. In total, 31 participants were used in this study, including 22 females and 9 males. 84% of all participants were undergraduate bachelors studying program engineering at NRNU MEPhI; their age was in the range from 19 to 22. The average age of all participants was 25.7. Russian was the native language for all participants. 81% had amateur experience with fine art, design or photography; 19% had no such experience.

Procedures. Experimental procedure was the following. Participants were presented with a set of 65 color bars on a computer monitor. These colors were chosen so that they would cover Itten's Color Wheel (Figure 1) almost evenly.

Figure 1. Itten's Color Wheel [2], which shows relationships among colors. Numbers indicate color groups.