

Mood Adaptive Display Coloring

Utilizing Modern Machine Learning Techniques and Intelligent Coloring to Influence the Mood of PC Users

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Marc Hermann

- Study of Computer Science, Doctoral Thesis 2013 (Ulm University, Germany)
- Certificate of Higher Education Pedagogy (Baden-Württemberg Certificate)
- Software Developer (Inneo Solutions GmbH, Germany)
- Senior Developer (Veroo Consulting GmbH, Germany)
- Since 04/2009 Lecturer for several courses like C, C++ and Java Programming, Software Engineering, Algorithms, Human Computer Interaction (Aalen University for Applied Sciences, Germany)
- Current Research Areas include Topics in Human Computer Interaction, E-Learning, Gamification and Mobile Augmented Reality



Motivation

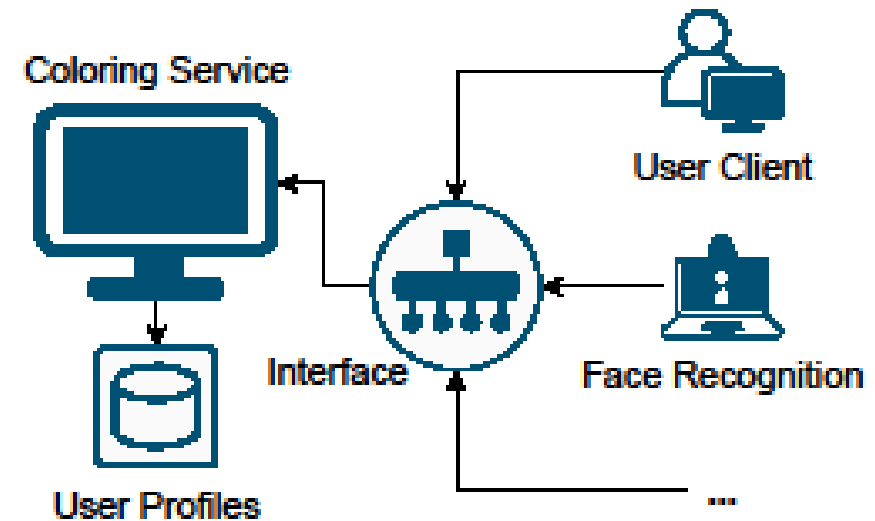
- colors affect human emotions and behavior (Elliot and Maier 2012)
- emotion can already be recognized and measured quite precisely with machine learning
- goal: improve attention and productivity of work with computer devices

Mood Adaptive Display Coloring

- background activity providing awareness of mood of user
- no interruption in work flow
- basic knowledge of color psychology as foundation
- highly customizable/personalizable

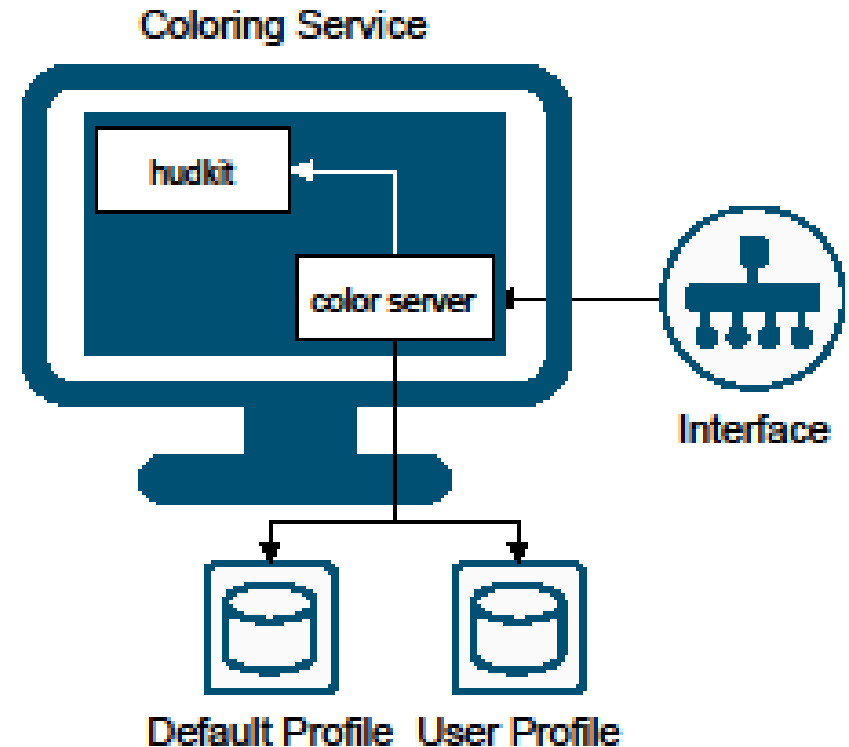
Solution Concept

- modular architecture for high adaptability
- user profiles for customizability
- replaceable interface providing communication between components for high interoperability
- face recognition client for passive mood recognition
- user client for active mood input



Solution Architecture

- core of service is the color server
- hudkit used to provide a color overlay
- communication between color server and hudkit realized by websockets
- color server listens on its d-bus interface for commands
- all clients communicate with server by d-bus interface
- default and user profile are used by color service



Survey

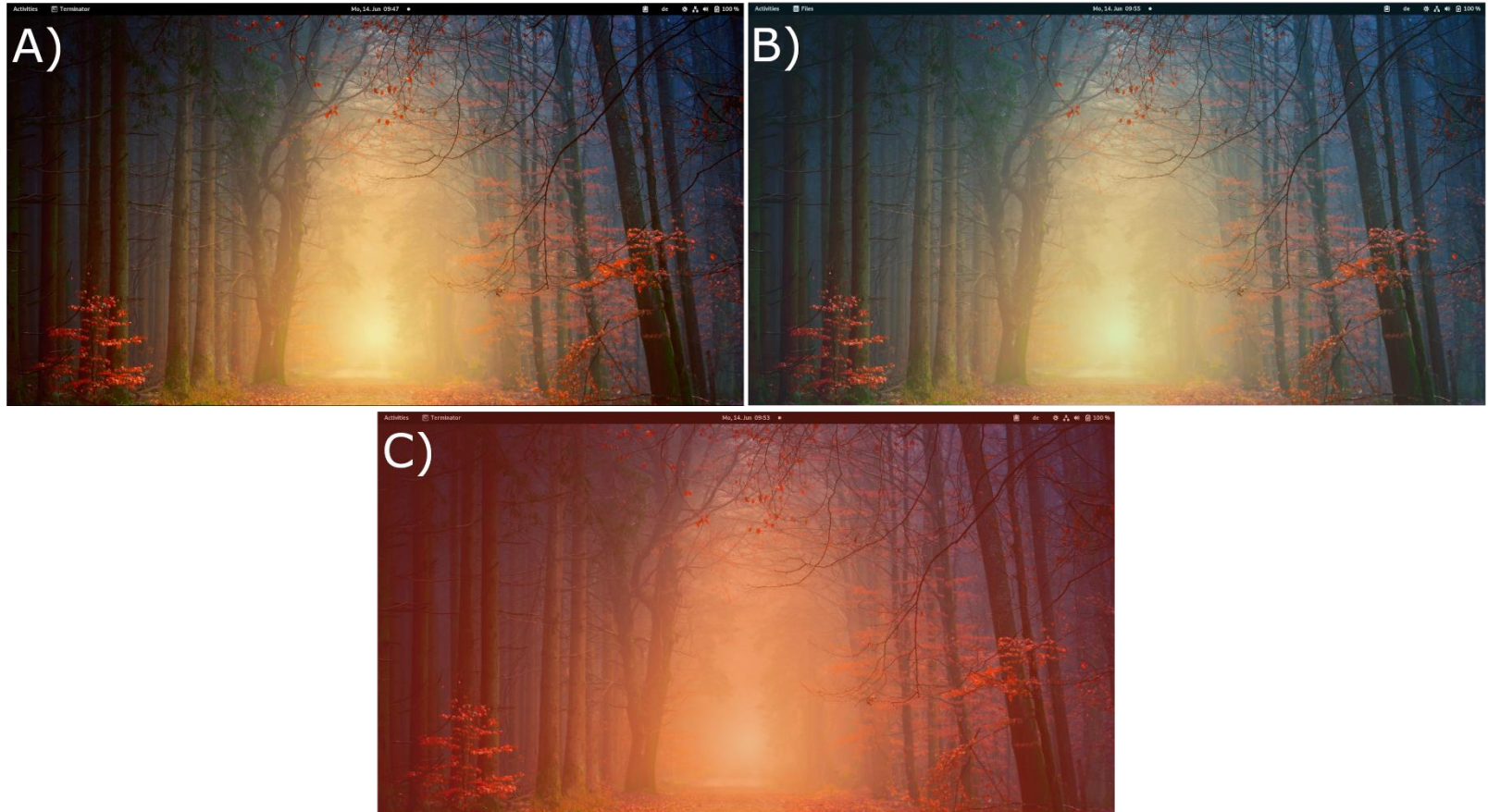
- Online-Survey on colors and associations
- Default profile based on results of survey

Color	Ca	V	Sa	Co	M	St	H
red	3,79	14,86	13,38	7,32	9,37	35,20	8,45
orange	8,24	19,41	18,09	6,02	3,02	16,94	13,49
yellow	3,53	21,15	7,21	8,95	3,78	14,31	17,53
green	22,09	18,34	15,44	15,49	2,27	2,96	24,72
blue	25,23	9,64	16,32	28,74	7,55	4,77	14,25
violet	11,37	3,35	11,32	5,34	11,48	5,76	6,56
grey	11,11	0,40	5,44	13,08	27,49	3,95	2,27
black	12,81	2,68	10,29	13,43	29,61	6,74	4,41
pink	1,83	10,17	2,50	1,72	5,44	9,38	8,32

Emotional Connection to Colors Survey, n=522, Values in %

Ca=Calm, V=Vitalizing, Sa=Safety, Co=Concentrated, M=Melancholy, St=Stressed, H=Happiness

Usage Example



A: neutral, B: mad, C. bored

Conclusion

- concept of software reacting on user's mood by changing coloring of display
- survey to identify colors for moods
- fully functional prototype for MAD-Coloring
- concept for case study

Future work

- software improvements, especially in display component
- emotion recognition improvements combining multiple inputs (e.g. facial recognition and health sensors of smartphones)
- study, preferably long-term study involving medical/psychological professionals

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Questions?

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