Ph.D. in Information Technology Thesis Defense

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Emanuele PUCCI – XXXVII Cycle

CONVERSATIONAL AI FOR INCLUSIVE WEB BROWSING: THE CONWEB APPROACH

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Abstract:

The evolution of the Web from static pages to dynamic, conversational interfaces is changing how users interact with technology. This thesis explores how inclusive design can empower the development of conversational web technologies, with a focus on accessibility for Blind and Visually Impaired (BVI) users. This research aims to bridge significant accessibility gaps in current web interactions by addressing two primary research questions:

- 1. How to design effective conversations with the Web?
- 2. How to transform web pages into dialogs with users?

Our methodology adopted a human-centered approach, beginning with preliminary interviews to understand BVI users' unique challenges in web navigation. Through questionnaires and iterative co-design sessions, we identified key pain points and designed a comprehensive set of conversational patterns for voice interaction. These patterns aim to enhance web accessibility through conceptual abstractions such as a conversation-oriented navigation tree to model conversation elements, intuitive and quick navigation mechanisms, content summarization, and robust conversation control options.

The core of this thesis is the Conversational Web (ConWeb) framework, which implements the library of conversational patterns that facilitate web browsing through voice commands. User studies with BVI participants demonstrated the framework's effectiveness in improving web navigation and access to information. Positive feedback from users highlighted the improved efficiency, ease of use, and overall better web experience, confirming the potential of conversational AI to create more inclusive web interactions.

In addition to the technological advancements, this thesis contributes to the theoretical understanding of how inclusive design can benefit from conversational AI. By integrating principles of Human-Centered Design and Participatory Design, the research discusses lessons learned for developing conversational interfaces that cater to diverse user needs. The findings emphasize the importance of user involvement in the design process and the role of advanced AI technologies in enhancing accessibility.

Ultimately, this thesis advocates for an inclusive approach to technology design, aiming to create AI systems that empower all users, regardless of their abilities or backgrounds. By prioritizing inclusivity, we can develop more equitable technologies that benefit society as a whole.

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