SCHOOL OF COMPUTATION, INFORMATION AND TECHNOLOGY

TECHNISCHE UNIVERSITÄT MÜNCHEN

Bachelor's Thesis in Information Systems

From UI Images to Accessible Code: Leveraging LLMs for Automated Frontend Generation

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I confirm that this bachelor's thesis in information systems is my own work and I have documented all sources and material used.

Munich, 11.08.2025 Marco Lutz

Acknowledgments

Abstract

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1 Introduction

1.1 Section

High quality web user interfaces are the backbone of our modern society. They allow us to present products or services in an interactive way and reach billions of users every day. However, the creation of Websites or user interfaces (UIs) follows a similar and repetitive pattern.
First UI designs are created with the help of special design tools. The UI designs present the foundation for software developers. In a second step, those designs are translated into functional UI code which tries to resemble the intended layout and structure, but also obey to other design aspects.
One essential, but yet frequently underestimated aspect in this process is *accessibility*: According to the official *WCAG* guidelines, code must be perceivable, operable, understandable and robust for people with various disabilities.
Complying with accessibility standards is not only an optional, moral aspect of web development, but it now has to follow regulatory boundaries. Ensuring accessibility is no longer optional. For instance the *European Accessibility Act* comes into effect on June 28, 2025 and obliges any e-commerce or digital service in the EU to comply with those standards.
Current Large-Language Models (LLMs) have shown signifant improvements in automatic code generation. Especially *Image-to-Code* tasks where UI designs are given as input and LLMs output the functional UI code, have been tested by various researchers in the past. Several benchmarks have shown the competitive performance of LLMs on those tasks. However, the capability of modern LLMs to generate accessible Code in an Image-to-Code environment has only started to gain researchers interest quite recently. Existing research in this field have compared human to the generated code and tried to better align with the accessibility standards. Nevertheless, this has never been tested in an Image-to-Code environment. Apart from that, accessibility does not only concern the visual appearance of a web user interace, but also its functionality. Thus, it requires the LLMs to have a deeper understanding than in classical Image-to-Code scenarios where LLMs only reproduce the input images pixel perfectly.

1.1.1 Our Contributions

In order to close this gap, we propose a large scale accessibility evaluation of LLM-based web code generation while also taking the visual similarity into account. Therefore, we use a dataset which contains of 53 real-world webpage examples which have been gathered from existing datasets and mutated in order to prevent data leakage. It covers a wide spectrum of layouts, content areas and accessibility features.
This dataset

1.1.2 Subsection

Citation test [Lam94]. See Table 1.1, Figure 1.1, Figure 1.2, Figure 1.3.

Table 1.1: An example for a simple table.

A	B	C	D
1	2	1	2
2	3	2	3

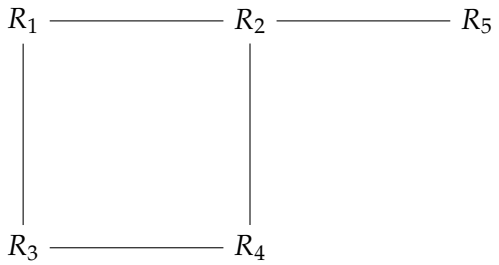

Figure 1.1: An example for a simple drawing.

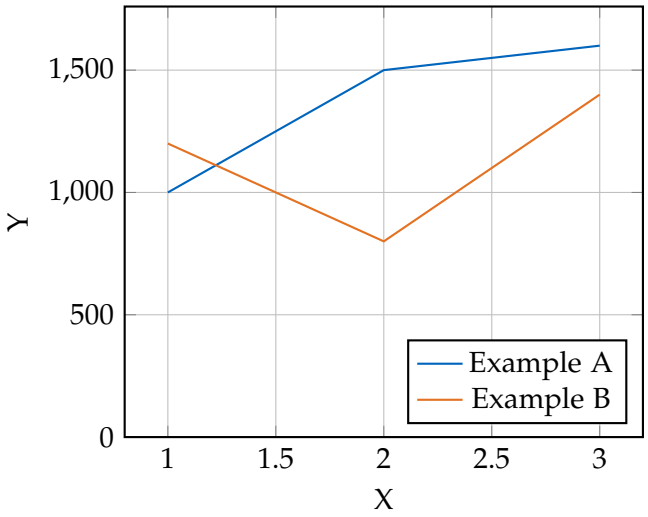

Figure 1.2: An example for a simple plot.

```
SELECT * FROM tbl WHERE tbl.str = "str"
```

Figure 1.3: An example for a source code listing.

2 Dataset

2.1 Section

2.1.1 Subsection

3 Benchmarks

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8.1.1 Subsection

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Bibliography

[Lam94] L. Lamport. *LaTeX : A Documentation Preparation System User's Guide and Reference Manual*. Addison-Wesley Professional, 1994.