Color Sense: Color Vision Deficiency Diagram Converter

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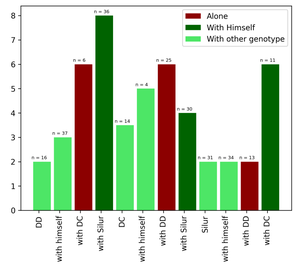
What is the Problem?

1/14 men and 1/200 women experience some form of **color vision deficiency**. Our goal is to **help TAs** convert diagrams in teaching materials to accessible forms and **improve the learning experience** of students.

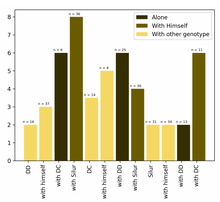
Simulations:

Effect as seen by colorblind students

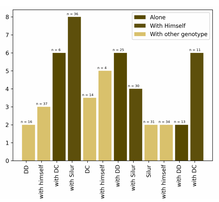
Source: https://daltonlens.org/colorblindness-simulator



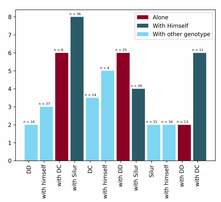
Original



Protanomaly



Deuteranomaly



Tritanomaly

Goals:

- compatible to all colorblind types
- easy-to-use and simplistic, minimizing the overhead for TAs

Our Solution

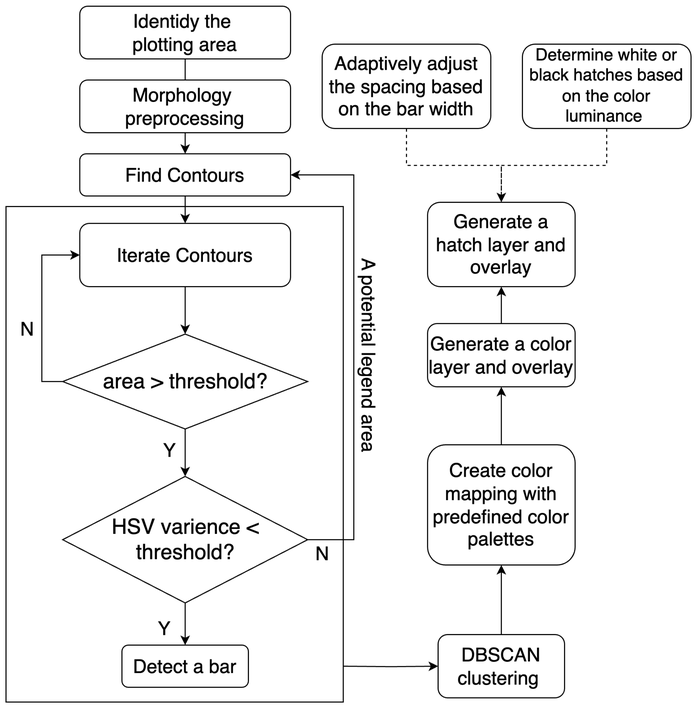
Scoring of User Input:

Good

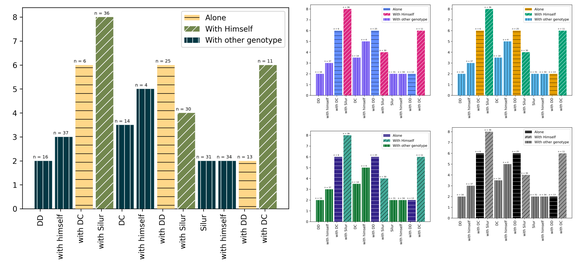
This graph is already highly accessible, and here is the new version with minor improvements.

- Generate an accessibility score of user's input based on **color contrast, grayscale, and pattern richness**.
- If the original diagram does not have enough accessibility, we convert the diagram for the user so that it is accessible to target users.

Bar-plot Conversion:



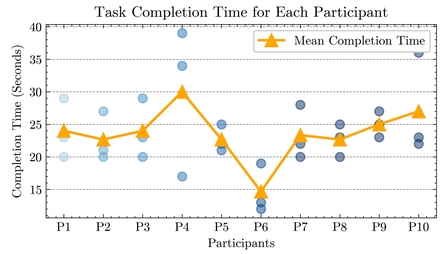
Different output diagrams based on the color blindness type chosen by the user:

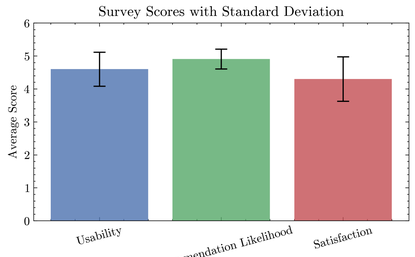


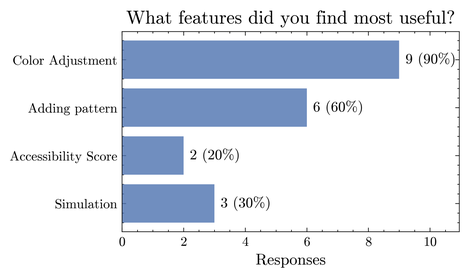
Specific color palettes for different color blindness groups

Evaluation

10 participants (students and TAs, with and without color deficiencies) completed **3 tasks** with ColorSense, followed by a survey.







Key Findings:

- **Responsiveness**: avg. time for each diagram **< 30s**
- **High User Ratings:**

4.6/5 usability

4.9/5 recommendation likelihood

4.3/5 satisfaction