A High Contrast Colour Theme for VS Code IDE

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Abstract - *This project named "Rev Blaze High Contrast", is a high contrast colour theme extension for Visual Studio Code Integrated Development Environment (IDE) aimed at developers with a colour vision deficiency called Deuteranopia. Constant inputs from the visually challenged were taken into account during the development of this theme. Development is done and tested on the same IDE. The extension is then made publicly available to download on the VS Code Marketplace. The steps to deploy the theme on the marketplace are also outlined in this paper. Results from the Analytics dashboard are also given in the paper to show the success of this extension.*

Key Words: VS Code, Colour Theme, VS Code extension, Colour Blindness, Deuteranopia, Development, Visual Studio Code

1. INTRODUCTION

Rev Blaze High Contrast is a VS Code extension that is currently publicly available to developers on the VS Code Marketplace. This open-source project is targeted at developers with Deuteranopia which is a type of colour blindness. The extension is meant to help them distinguish between subtle differences in the editor window of the widely used Integrated Development Environment (IDE) *Visual Studio Code* using the colour palette their perception is restricted to.

2. LITERATURE SURVEY

The ability to see colour depends on three genes: *OPN1LW* (red pigment), *OPN1MW* (green pigment), and *OPN1SW* (blue pigment). These genes produce light receptor cells. These cells have two components: rods and cones. Deuteranopia (red-green colour blindness) arises due to deficiency in the green pigments *OPN1MW* or the red pigments *OPN1LW* [6].

Deuteranopia is, by far, the most common colour vision deficiency [5]. People with this disability often have trouble perceiving the red-green spectrum clearly.

Listed below are several reasons why this type of colour blindness is prevalent.

- Retinal diseases
- Issues with the optic nerve
- Age-related conditions
- Exposure to high organic solvents
- Side effects of certain drugs
- Genetic mutations

In most cases, the cause of Deuteranopia is genetic. Studies show [3] that some form of colour blindness is present in 8% of all men and 0.5% of all women, with Deuteranopia being the most common. Correlation of this data with the data of the number of developers [4], and the gender spread, shows that over 120,000 software developers have this form of colour vision deficiency today.

3. CODE EDITOR

In order for the extension to have the largest impact, it made sense to select an IDE that already had a large community built around it. *Visual Studio Code* was selected as it is currently one of the best free-to-use code editors [1] in the market. It is consistently highly ranked, and has good support from the community and for third-party open-source extensions. The 2022 Stack Overflow Developer Survey [9] results show that close to 74.48% of developers use VS Code. This number is a 3.42 percentage point increase over the previous year's survey [2].

Visual Studio Code, also commonly referred to as VS Code, is a source-code editor that was developed and currently maintained by Microsoft. Salient features of this code editor include support for debugging, syntax highlighting, intelligent code completion, snippets, code refactoring, and embedded Git [10]. Users can customize their editor experience using colour themes, keyboard shortcuts, preferences, and install extensions that add additional functionality. Rev Blaze High Contrast is one such colour theme extension that is meant to provide a specific community of users with a superior coding experience.

Fig -1: The VS Code editor window along with the VS Code marketplace for downloading third part extensions

This code editor can be installed from the official website https://code.visualstudio.com/download and is supported by multiple operating systems.

4. SETUP

4.1 Installing dependencies

To begin, all development dependencies required were installed. The NPM package manager is required to install the project dependencies. This package manager comes installed along with Node.js. Node.js is a local Java Script runtime environment for server-sided applications. Once the NPM package manager is set up, there are three dependencies that need to be installed using it.

- vsce
- yo
- generator-code

All of these packages can be installed using the command *npm install –g <package name>* on the terminal integrated in VS Code. The –g flag is added before the package name to install it globally on the system and also add the required file location to the PATH environment variable.
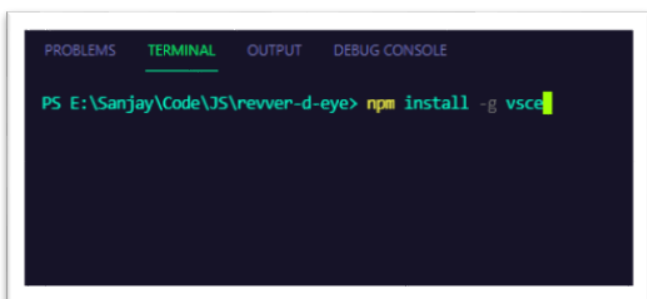

Fig -2: Installation of vsce package on the VS Code integrated terminal

4.2 Project Setup

The project was set up by running the following command in the integrated terminal on VS Code.

yo code

This will go through a series of steps requiring inputs from the user at each stage. The *New Colour Theme* option is selected and then the option *No, start fresh* is selected. This will then go through the different details required for the automatic creation of the base template to start off with.

5. DEVELOPMENT

Creation of an extension requires knowledge of basic terminal commands, scripting, Azure DevOps, hexadecimal colour codes and JSON files. Each element of the editor window can be customized in terms of colour in a main JSON file. The VS Code colour theme extension API documentation was used for reference [8].

Colour combinations like black and lime, and deep blue and yellow were tested. Upon research and proper tuning based on the reviews obtained, maroon proved to be a good candidate for the background colour. Hence, it was decided that an off-brown maroon would be the base colour, with lime to contrast it. This may seem to be counter-intuitive as Deuteranopia affects the perception of the colours red and green. But care was taken to ensure that different panes were of different shades and that the difference between those shades were sufficient for users to be able to discern between the different elements in the editor window. The maroon and lime combination, ensured a proper contrast was maintained between the panes in the window and also received good feedback. Various shades of maroon were used in different panes and the terminal, while lime was used in the menus, and in the borders.

Fig -3: Shades of maroon used in the editor window

These two shades of maroon can be mistaken for the same colour, but work well when combined with the contrast colour element lime.

HEX   #21E607   HEX   #16BD00

RGB   33, 230, 7   RGB   22, 189, 0

CMYK 86, 0, 97, 10   CMYK 88, 0, 100, 26

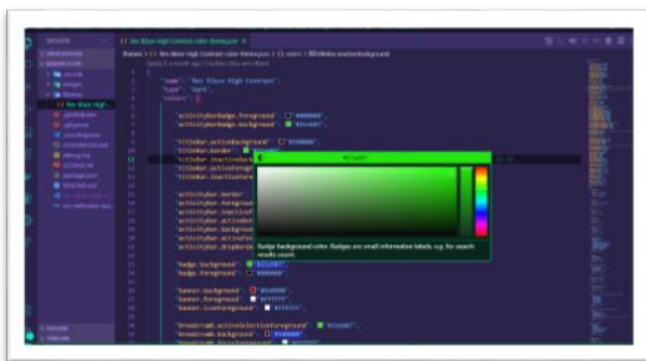**Fig -4**: Shades of lime used in the editor window

Fig -5: Main JSON file for colour customization

6. DEPLOYMENT

6.1 Microsoft Account Creation

VS code is a source-code editor made by Microsoft. Even though it is open-source now, Microsoft provides support and also maintains the extensions. Hence, a Microsoft Account is required to publish an extension onto the Visual Studio Code Marketplace.

6.2 Creation of PAT on Azure DevOps portal

Extensions in VS Code are pushed into production through the Azure DevOps pipeline. In order to make use of this pipeline, a Personal Access Token (PAT) must be created on the Azure DevOps Portal. The allowed permissions for the PAT must include Marketplace access and management.

6.3 Creating a Publisher on VS Code Marketplace

Once a PAT has been created on the Azure DevOps portal, a publisher has to be created on the VS Code marketplace in order to publish the extension. The publisher details will be visible externally.

6.4 Pushing into Production

Once a publisher and a PAT is created, the extension can now be pushed to production. On the integrated terminal, the publisher is then logged in using the vsce package and the PAT.

vsce login <publisher name>

Upon entering this command, it will then ask for a PAT. After this is entered, the concerned publisher would be logged in to the Azure DevOps portal programmatically. Next, the extension created is packaged using

vsce package

The extension can then be published by simply typing the command

vsce publish

7. ANALYTICS

The status of published extensions can be viewed on the publisher dashboard. Once an extension passes all verification checks, it then moves through the pipeline to be deployed in to production. The extension can be seen in the VS Code marketplace at this point.
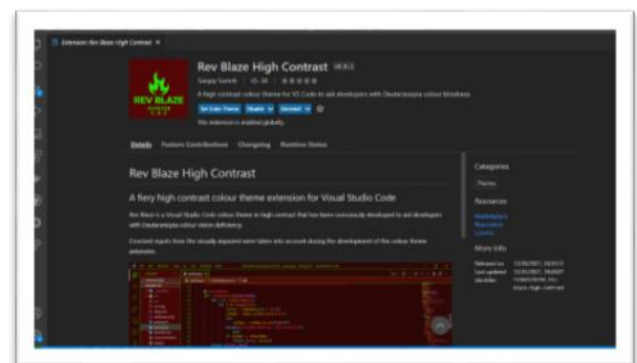

Fig -6: Rev Blaze High Contrast VS Code colour theme on the VS Code Marketplace within the editor

The publisher dashboard also has provisions to view other analytics on a published extension. The conversion funnel, ratings and reviews, and the changelog of an extension can be viewed.
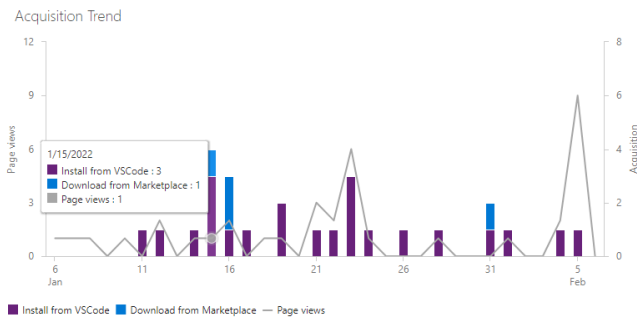
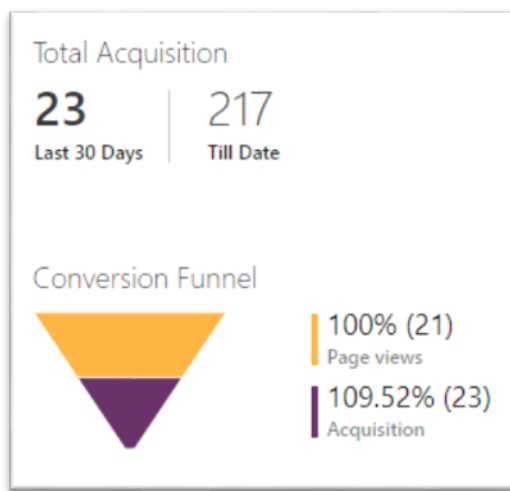**Fig -7**: Acquisition trend for Rev Blaze High Contrast extension

Fig -8: Conversion Funnel for Rev Blaze High Contrast extension

8. TECH STACK

This section covers the different technologies employed in the creation of this project.

8.1 Code Editor

Visual Studio Code by Microsoft

8.2 Package Manager

NPM – Node Package Manager

8.3 NPM Packages

vsce, yo, generator-code

8.4 Platform

Azure DevOps Pipeline to publish to Visual Studio Code Marketplace.

9. RESULTS & CONCLUSIONS

Rev Blaze High Contrast is a VS Code colour theme extension in high contrast that has been consciously developed to aid developers with Deuteranopia colour vision deficiency. The extension has been well received with over 200 downloads from the marketplace as of August 2022.

Link to download and install the colour theme: https://marketplace.visualstudio.com/items?itemName=revmatcher01.rev-blaze-high-contrast

Link to the source code of this color theme extension: https://github.com/RapidCompiler/rev-blaze-high-contrast

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