Software Design Document

Artificial Intelligence and Data Science for Climate Change Management with Focus on Drought and Wildfire in California

Prepared by:
Huy Lam
Lunar Raborn
Brian Gonzalez
Guadalupe Ortiz Nunez

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NASA & LA City
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Revision History

Version	Date	Description
1.0	2025-04-20	Initial draft of the SDD document.
1.1	2025-04-25	Added system architecture details.
1.2	2025-04-28	Revised UI design and added database explanation.
1.3	2025-04-30	Updated system requirements and external API integration details.
1.4	2025-05-05	Final revisions based on feedback. Added additional features to the UI.

1 Introduction

1.1 Purpose

The purpose of this document is to describe the design and architecture of the web application for data science and climate change management, particularly focusing on wildfire and drought data in California.

1.2 Intended Audience and Reading Suggestions

- Software Developers and Engineers
- Data Scientists and Researchers
- Environmental Agencies and Stakeholders

1.3 Product Overview

This web application will visualize climate change-related data, such as wildfire and drought patterns in California, utilizing maps created with ArcGIS and real-time data sources from APIs.

2 System Architecture

2.1 Overview

The system is a cloud-based web application that integrates various data sources, including ArcGIS maps, wildfire data from CAL Fire, and drought severity data from NOAA. It utilizes JavaScript, HTML5, and CSS for the frontend, with backend data being fetched dynamically from external APIs.

2.2 Workflow

The system works as follows:

- Users access the web application via their browser.
- The frontend displays maps and data visualizations.
- API calls are made to retrieve real-time wildfire and drought data.
- The data is displayed in the form of interactive maps and graphs, allowing users to analyze trends and correlations.

2.3 Site Breakdown

- Home Page: Introduction and overview of climate change effects.
- Wildfire Map: A real-time map displaying wildfire locations and severity.
- Drought Map: Interactive visualization showing drought severity levels.
- Data Analysis Dashboard: A section for analyzing data trends over time.

3 User Interface

3.1 UI Overview

The user interface (UI) will be clean, intuitive, and responsive, designed for accessibility on both mobile and desktop devices. It will allow users to navigate between the maps, view real-time data, and interact with various features such as zoom, layer toggles, and data filters.

3.2 Database Explanation

The system does not utilize a traditional database but relies on **real-time data fetched from external APIs**. The data from APIs like NOAA and ArcGIS will be parsed and displayed directly on the frontend.

3.3 How to Use

1. Navigate to the homepage. 2. View the Wildfire Map to see real-time fire locations. 3. Toggle between wildfire and drought severity data layers. 4. Use the Data Analysis Dashboard for trends and historical comparisons.

Glossary

Acronym	**Definition**
API	Application Programming Interface
UI	User Interface
JS	JavaScript
NOAA	National Oceanic and Atmospheric Administration
CAL Fire	California Department of Forestry and Fire Protection

References

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- https://supabase.com
- https://gdpr.eu/
- https://oag.ca.gov/privacy/ccpa
- https://www.w3.org/WAI/standards-guidelines/wcag/