DS-Board: An Interdisciplinary Approach to Open Educational Resources in Data Science and Machine Learning

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Abstract

This paper presents DS-Board, an Open Educational Resource (OER) project that merges the fields of Data Science and Machine Learning. DS-Board leverages the power of JavaScript and its libraries, p5.js and ml5.js, to provide a free and accessible tool for teaching data science and machine learning concepts. The project also utilizes the Svelte framework for building user interfaces. This interdisciplinary approach, combining creative coding and data science, offers potential applications in research, industry, and education.

1 Introduction

Open Educational Resources (OER) are a powerful tool for democratizing education, making high-quality learning materials accessible to all. DS-Board is an OER project that focuses on data science and machine learning, two rapidly growing fields with significant impacts on society. By combining principles from Data Science and Machine Learning, DS-Board aims to create a platform that is not only educational but also adaptable and user-friendly.

2 Methodology

DS-Board utilizes the ml5.js library, a beginner-friendly machine learning library for the web. It provides easy-to-use functions for tasks like clustering, which is used in DS-Board to visualize complex data science concepts. The Svelte store is used for state management, allowing the application to efficiently update and render changes in the data.

The project includes a function for handling file uploads, which allows users to upload their own CSV files for data analysis. This function uses the 'processCSVFile' utility to parse the CSV file and then calls the 'DrawClusters' function to visualize the data.

3 Implementation

The ‘DrawClusters‘ function is a key part of DS-Board. It creates a new sketch in p5.js, a JavaScript library for creative coding, and uses the k-means clustering algorithm from the ml5.js library to cluster the data points. The function can handle data from both CSV files and user input, making DS-Board adaptable to different learning contexts.

4 Processing and p5.js

Processing is a flexible software sketchbook and a language for learning how to code within the context of the visual arts. It's been instrumental in promoting software literacy within the visual arts and visual literacy within technology. p5.js is a JavaScript library that starts with the original goal of Processing, to make coding accessible for artists, designers, educators, and beginners, and reinterprets this for today's web. The use of Processing and p5.js in DS-Board allows for a more interactive and engaging learning experience, bridging the gap between the arts and sciences.

5 Community and Collaboration

DS-Board is designed to be a community-driven project. It encourages contributions from developers, educators, and learners, allowing the platform to evolve and grow with the needs of its users. This collaborative approach is a key aspect of Library Science, which emphasizes the importance of community engagement in information management.

6 Conclusion

DS-Board demonstrates the potential of interdisciplinary approaches in creating effective educational resources. By combining principles from Data Science and Machine Learning, and leveraging the power of JavaScript, p5.js, and ml5.js, it provides a platform that is not only educational but also adaptable and user-friendly. As an Open Educational Resource, DS-Board has the potential to democratize data science education, making it accessible to a wide range of learners.