Animal Adventure: Explore Wildlife with Colorful Data Visualization and Enhancing Kids' Visual Literacy

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1 Introduction

The importance of raising awareness about the environment among children, from elementary school to university, has long been a goal in the United States [1]. As early as the 1800s, U.S. President Thomas Jefferson envisioned this need.

In many cases, readers, regardless of age, choose optical presentation over words. [2] The combination of pictures and words is more powerful than each one separately. Watkins et al. have noticed that elementary school students use their imaginations to interpret visual representations instead of relying on the associated text. [3]

We believe, in today's digital age, the integration of technology into education has become an increasingly popular and effective way to engage young learners. Animal learning has long been a cornerstone of early childhood education, captivating young minds with the wonders of the natural world. By combining this timeless subject with modern technology, we aim to not only foster a deeper appreciation for wildlife but also cultivate essential skills in data literacy and visualization literacy for the young learners.

2 One-sentence description

With a key focus on promoting data literacy skills among young learners, we aim to empower children to interpret and analyze information effectively through interactive visualization and guided exploration of our web.

3 Project type

Interactive Educational Visualization

4 Audience

This project targets young learners as the audience who intend to learn about animals in a way that is interactive, fun, and engaging.

This project meets the audience's needs in many ways:

- It caters to an educational audience by providing comprehensive information about animals, including scientific names, enriching their learning experience from elementary through high school levels.

- The incorporation of interactive features such as the USA map and graphs enables children to independently explore and discover data through engaging colors and animations, enhancing their attraction to the learning experience.

We are collaborating with students from Elm Park Elementary School as our audiences for this project. This collaboration enables us to refine and enhance our project based on valuable real-world feedback from the audience.

5 Approach

Our approach is to make the visualizations colorful and interactive, intending to attract children's curiosity about natural resources and wildlife. We believe this approach is effective and will be successful because of the following aspects:

- The application's capacity to engage children is poised to revolutionize their perception and interaction with it, fostering continuous excitement and sustained involvement.
- The ability for the application to allow the children to explore at their own pace and based on their own curiosity.
- As the app progresses, it will gradually introduce increasingly complex visualizations, accommodating children of varying skill levels by starting with simpler graphics and advancing to ones that are more intricate.

6 Best-case Impact Statement

In the best-case scenario, the impact of our project extends beyond Elm Park Elementary School to empower children from diverse educational backgrounds to effectively engage with wildlife learning. By providing an immersive online platform enriched with interactive visualization tools, we not only foster a deeper understanding of the natural world among young learners but also equip them with invaluable skills in interpreting and analyzing information. As a result, our initiative has the potential to be widespread in educational organizations, reaching more schools and communities, and igniting a passion for wildlife and data visualization.

7 Major Milestones

- Collecting the dataset that contains suitable information.
- Sketching and UI/UX Design.
- Creating and conducting experiments based on goals and objects.
- Testing the developed app.
- Implementing the app and monitoring that is working as designed.
- Collect experiment data from the audience.
- Analyze and present.

8 Obstacles

8.1 Major Obstacles

Challenge 1: Potential failure to meet deadlines due to various factors such as conflicting schedules, technical glitches, and miscommunication.

Mitigation:

- Implement Agile methodology to adapt to changes and prioritize tasks efficiently.
- Foster proactive communication through regular vertical weekly meetings, group chats, and other communication channels.
- Encourage transparency by openly sharing progress updates and workload distribution.
- Delegate tasks appropriately to ensure timely completion.

Challenge 2: Ensuring the accuracy and reliability of project data poses a significant challenge.

Mitigation:

- Source data from reliable and reputable sources to maintain accuracy.
- Conduct exploratory data analysis to identify potential issues and enhance data quality.
- Implement measures to continually improve data integrity throughout the project lifecycle.

Challenge 3: Technical hurdles may arise during any phase of the project, from development to deployment.

Mitigation:

- Promptly address technical issues as they arise to prevent delays.
- Seek assistance from teaching assistants (TAs) or team members when spending significant time on a specific problem.

Challenge 4: Cultural and age appropriation issues in visualization.

Mitigation:

- Adopting tailored literacy approaches
- Ensuring designs are culturally respectful, sensitive, and inclusive of diverse developmental stages

8.2 Minor Obstacles

Challenge 1: Inadequate domain knowledge or coding skills among team members can hinder project progress.

Mitigation:

- Invest in improving necessary skills through self-learning resources and peer support.
- Foster a culture of knowledge sharing and mutual assistance within the team.

Challenge 2: Incomplete or unclear communication can lead to misunderstandings and inefficiencies.

Mitigation:

- Encourage team members to seek clarification when necessary to ensure mutual understanding.
- Establish clear communication protocols and channels to facilitate effective information exchange

Challenge 3: Sustaining project relevance and effectiveness requires a commitment to ongoing improvement

Mitigation:

- Continuously monitor and evaluate project outcomes to identify areas for enhancement.
- Iteratively refine the platform through regular updates and enhancements based on feedback and performance analysis.

9 Resources Needed

- Computational Resources: Access to high-performance laptops or computers with sufficient processing power and memory is essential, especially for tasks involving large datasets or simulations. We consider utilizing cloud computing services or dedicated servers if local resources are insufficient.
- Testing the application across different platforms (e.g., web browsers, and mobile devices) requires access to various testing environments. We consider using emulators, virtual machines, or physical devices to ensure compatibility and functionality across different platforms.
- Educational content related to wildlife, including information about different animal species, habitats, ecosystems, etc. This content could include text, images, and interactive elements.
- Code to build the web platform to host the educational resources and interactive visualizations.
- Utilize d3 to create interactive charts, graphs, maps, and other visualizations that engage learners.
- An engaging user interface design to enhance the learning experience for young learners.
- Partnership with schools, educators, environmental organizations to promote the project and encourage adoption among the target audience.

10 5 Related Publications

Muthersbaugh discussed historical significance as it outlines the introduction of environmental lessons in schools and delineates methods for teaching with and without computers. Its insights serve as a guide for our project development, helping us understand user needs and ensuring legal compliance. [1]

Bishop presented Construct-A-Vis, a tablet-based tool designed to explore the feasibility of free-form and constructive visualization activities with elementary school children. We can adopt some of their findings into our visualization design. [4]

Alper discussed their work for finding a novel approach for teaching visualization at elementary school. Their findings offer promising insights, suggesting that successful integration of visualizations in educational settings is achievable. [5]

Gäbler explored the implementation of data visualization in an educational setting using a game called “Diagram Safari”. The game, designed to be interactive, has shown promising potential as an effective educational tool. Their study and designed game can provide us valuable insights and inspiration. [6]

In this state-of-the-art report, Elif provides a comprehensive overview of the current visualization papers in visualization literacy, especially in studies that concentrate on data visualization literacy using interactive visualization techniques. It summarizes and analyzes the most recent research findings, methodologies, technologies, trends within visualization literacy. [7]

11 Define Success

Overall, success in this project can be characterized by its ability to effectively engage young learners, foster a deeper understanding of wildlife, and cultivate essential skills in data literacy and visualization. This can be measured through pre- and post-assessments, surveys, and qualitative feedback from educators and students.

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