

2024 Nittany AI Challenge

Submission ID: 31

TEAM INFORMATION

1. Project Team Name:

KinderVerse

2. Team Members:

*List each team member including Name, PSU Email, Campus, and College
(ex: Jane Doe, jxd123@psu.edu, Shenango, Engineering)*

Suraj Kumar, smk6961@psu.edu, University Park, Engineering
Lucas Ligenza, lql5443@psu.edu, University Park, Engineering
Aneesh Singh, azs7281@psu.edu, University Park, IST
Daniel Woodford, dfw5416@psu.edu, University Park, IST
Alexander Foor, akf5643@psu.edu, University Park, Engineering

3. Primary Contact/Team Lead:

Suraj Kumar, smk6961@psu.edu, 814-232-0057

PROJECT INFORMATION

4. Problem / Opportunity Statement

Documentation should include an overview of the problem and the method used to address that problem. This should demonstrate that you clearly understand the problem or opportunity you are addressing with AI.

Response is limited to 300 words.

In the aftermath of the unfortunate COVID-19 pandemic, global research shows a concerning decline in the reading and comprehension levels of students and children. Due to the forced stay-at-home, children spent an abundant amount of time on screens, retaining nothing beneficial from it. Recognizing this issue, we created KinderVerse, an innovative solution utilizing AI technologies to enhance the learning experience for every child. We have fine-tuned an LLM to generate educational, moral-based stories, keeping children engaged, while creating a positive lasting impact. In addition to our story generation, our app incorporates image generation to illustrate the stories and specific, core vocabulary. This approach aims to enhance comprehension and create a fun learning environment. We understand the importance of a child-friendly user interface, and thus, our app contains a design featuring large buttons, interactive stories, and visually appealing imagery. This thoughtful design ensures a simple yet powerful experience for young minds, promoting active participation and exploration. Our app ensures that we don't use any personal information for the children and all the stories are going to be stored locally. We also understand that this app is meant for children, which is why we have instilled parental access so the parents are able to monitor their child's progress and watch over their actions. In all, KinderVerse aims to be a reliable substitute for the addictive technology by providing a fun, yet meaningful learning experience.

5. MVP Use Case

Provide a sample use case for the tool. Describe how someone will use the MVP functionality you intend to build and the benefits or impact the MVP will provide. Response is limited to 300 words.

Sarah, a mother, is concerned about her son Tom's waning interest in reading and learning due to excessive screen time during the post-COVID era. She discovers KinderVerse, an app designed to address this very issue, and downloads it, hoping to reignite Tom's enthusiasm for learning.

Upon opening KinderVerse, Sarah and Tom are welcomed by a user-friendly interface, tailored for children with large, colorful buttons and engaging visuals. Sarah sets up a profile for Tom, and the app's AI, powered by a specialized LLM, generates a personalized, educational story based on Tom's age and interests. These stories are not only captivating but also imbued with moral lessons, ensuring a wholesome learning experience.

As Tom interacts with the story, vibrant, AI-generated images illustrate the narrative, enhancing his comprehension and retaining his interest. The app's interactive elements encourage active participation, transforming passive screen time into a productive, educational experience.

Benefits and Impact:

KinderVerse offers a tailored learning experience that revitalizes children's reading habits and enhances their understanding through visual stimuli. The app makes screen time enriching, replacing aimless scrolling with meaningful, moral-based stories. Furthermore, KinderVerse ensures privacy and safety, storing content locally and providing parental controls for monitoring progress and activity.

Our vision with KinderVerse is to create a global impact, offering families a tool that not only entertains but educates, fostering a love for learning in children. This innovative approach to screen time is our answer to the challenges faced by parents like Sarah, who seek to nurture their children's minds in an increasingly digital world.

6. Data Availability

Detail the data sources leveraged within the prototype as well as the data sources necessary if this project moved to MVP. If available, please detail the location and availability of the data sources and/or the plan for collecting the necessary data. Remember that while we can provide some assistance with finding data sources, finding and gaining access to those sources is the team's responsibility. Response is limited to 300 words.

For the prototype of KinderVerse, we curated a dataset of children's stories with moral themes, targeting the 3-5 year age group. This initial dataset, sourced from various online platforms, was selected based on specific criteria such as moral content, genre, and vocabulary. This foundational dataset played a crucial role in fine-tuning the Llama 2 model for generating age-appropriate and morally enriched stories.

As we transition to the MVP phase, our strategy involves significantly expanding and diversifying our dataset. A promising resource is the substantial children's story dataset released by Facebook a few years ago. Utilizing this and similar datasets will allow us to refine and optimize our model more effectively. Our approach includes data augmentation techniques to broaden the range and depth of content, thereby enhancing the story generation capability and linguistic richness of our AI model. The team is committed to ongoing data collection and curation, ensuring the continual evolution and improvement of the AI models in use.

For image generation in the prototype, we employed prompt engineering techniques. However, moving towards the MVP, we aim to develop and fine-tune our own model, specifically tailored to the vocabulary component of KinderVerse. This shift will give us greater control over the image generation process, further minimizing the already negligible risk of inappropriate content.. To achieve this, we plan to compile a comprehensive dataset of nouns, accompanied by high-quality, educational images. This will significantly improve the visual learning aspect of our core vocabulary feature, enhancing the overall educational value of the app.

Our data strategy is focused on maintaining a dynamic and robust dataset that supports and grows with KinderVerse, ensuring that it remains a cutting-edge, safe, and effective learning tool for children.

7. Technology

Provide a technical description of the approach the team used to achieve its proposed goal, including the ways in which the selected AI platforms are used within the prototype and how the team anticipates using those and other services in the MVP phase. Specifically, the documentation should include a list of the components of the selected AI platforms that are leveraged in the prototype, any additional components that may be leveraged in the development of the MVP, and additional services that may be necessary for continued development. Response is limited to 350 words.

Your response provides a comprehensive overview of the KinderVerse prototype and its development plans. To refine it further within the 350-word limit, we can streamline the technical description, focusing on key AI components and planned enhancements. Here's the revised version:

KinderVerse, an AI-driven educational platform, uniquely combines two advanced AI technologies to enhance children's learning experience: the Language Learning Model (LLM) and the Image Generation Model.

Language Learning Model (LLM):

At the core of KinderVerse is the LLM, built upon the foundation of the sophisticated Llama 2 model. This AI component is responsible for generating captivating, moral-based stories tailored to each child's age and interests. It introduces progressively complex vocabulary to foster linguistic development and includes interactive elements with decision points to enhance cognitive skills.

Image Generation Model:

In tandem with the LLM, we employ the DALL-E-3 model for image generation. This model creates vivid visual representations of key nouns and concepts within the stories, facilitating visual learning and aiding comprehension. The images are integrated into a dynamic word bank, encouraging children to collect and learn new words, thus building their personal dictionaries.

User Interface Design:

The user interface, developed with React Native, is optimized for mobile usage, featuring large, child-friendly buttons, engaging interactive storytelling components, and visually appealing graphics. This design ensures ease of use for our young learners, making the learning process both fun and effective.

Privacy and Security:

Prioritizing privacy and security, KinderVerse does not utilize personal data. All stories are stored locally, and robust content filtering mechanisms are in place to maintain a safe and positive learning environment.

Future Development Goals:

Enhancing accessibility by introducing adjustable text-to-speech speeds, multilingual support, and more complex story layers.

Improving the efficiency and speed of story generation by continuously enriching the LLM with diverse data.

Gradually incorporating advanced vocabulary to support richer language development.

Exploring additional AI services to introduce new features and further enhance the platform's capabilities.

We also want to make a version for tablets, as those are very popular for children and would provide a bigger, more story-book-esque experience.

These advancements aim to elevate KinderVerse, making it an increasingly effective, enjoyable, and comprehensive educational tool for children worldwide.

8. Prototype Video Overview

All teams submitting a prototype for review are required to submit video demonstrations of their working prototypes. The videos must:

- *be no more than 5 minutes in length.*
- *explain the intent, goals, and potential impact of the solution.*
- *demonstrate the basic, working functionality of the prototype.*
- *be available through a YouTube link accessible for viewing by the Challenge reviewers.*

The production value of the videos will not be factored into the review, but they must clearly and accurately represent the prototype functionality. To help, Media Commons at Penn State provides free One Button Studio options throughout the Commonwealth.

****See Video Provided in the Folder**