



Whip-Smart

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ABSTRACT

Whip-Smart is an E-learning application designed for the kids of 2-7 years of age. Usually the kids of these ages do not have a good attention span. To grab their attention and to be able to educate them can be a difficult task for both parents and teachers. This age forms the most important part of their life as the foundation for future studies is based on what they learn in their early years. Hence it becomes more important to educate the kids in the best possible way and make them understand every concept very clearly. This application is designed keeping in mind the same views about children's education. The children of different ages are assigned with a series of day-to-day tasks pertaining to their age that they're supposed to complete. On successful completion they're rewarded and their performance throughout is recorded. The detailed report of the child's performance is available for the parent to view. The application is designed in such a way that it is user friendly. The tasks are designed with animations and interactive learning is ensured to make it more interesting for the child. Various areas of study for pre-school learning are covered. Data integrity and security are ensured. Due to the pandemic situation and lockdown in various parts of the world, the most affected are the kids of these ages as they require more care and attention while learning. And in various parts of the world where availability of good education is in itself a huge privilege, a pre-school education tool like this serves the purpose of providing quality education and preparing the children of today for a better future with good knowledge and understanding.

Keywords: Kids, E-learning, CNN, Machine Learning, Data Analysis

I. INTRODUCTION

Intelligence is not rare among human beings. It is found in children at birth. With the proper stimulation, it's possible to nurture the event of reasoning and problem-solving skills in young children. The first six years of life are the most important years of a child's education. One of the greatest struggles people face as parents is how to foster digital savvy- ness in their children – while they don't want to keep them away from today's latest technology, they would want to make sure that

this is the application that they do not have to feel any guilt in handing it to their child when the going gets tough, because it undoubtedly stimulates educational (and sometimes even emotional) growth, and not to mention that it is extremely fun and super engaging while also ensuring that it is safe and secure. What they experience will instil curiosity in children and help their little brains grow.

Parents can always use some extra help at times to make their children learn and sometimes that help is an app. With the advancements in technology, finding information on how to enhance and track

your child's development is literally at your fingertips. This interactive application offers various development activities which will help you track your child's development. These categories include motor skills and emotional, sensory and cognitive development; all focused on helping your kids reach his/her first milestone. All activities in this app are engaging and also there are beautiful rhymes and songs.

Children's brain development happens rapidly from the time of birth up to three years. There are four main areas of development: motor (physical), language and communication, social and emotional, and cognitive development. Brain development is part of cognitive development. This cognitive development tells us about how a child's intellect grows, and that includes thinking, learning, understanding, analysing and problem-solving skills. These skills play a prominent role in all the other areas of development of a child. Hence the first three years of a child's life are very vital for learning and overall development of the child.

Due to the pandemic, all the schools are shut and the students are stranded at home and education is at a standstill. The older children who are learning via online classes have the ability to understand the concepts even without much guidance, but what about the kids? The Application Whip- Smart will always help kids in their overall development. This app aims to assist you in simplifying daily life and be the best parent or guide through each stage of your little one's development. Other features can also be included such as a personalized daily calendar of your baby's development, information on your child's health and safety and weekly activities for your child using the data obtained from the interaction with this app.

II. SYSTEM ANALYSIS

A. Existing System

There are various online learning platforms for kids like ABCmouse, Reading Eggs, Starfall, Brain pop for kids of the age 2-8 of years, which concentrate mainly on teaching a lot of science, math and other knowledge through videos which is great but does not focus on overall development of the child. Moreover, the assessments to analyse the performance may not be accurate. With the help of data analytics we will be able to analyse the child's performance and interests and also provide a report to the parent.

B. Proposed System

Our platform Whip-Smart makes use of the latest technology to provide the child with the best learning experience. It is majorly focused on providing certain features to enhance the child's visual perceptions and assimilation of knowledge. The main focus is to make learning fun and interactive for kids. Some of the various features we are trying to implement are handwriting recognition (to teach the child to write digits/characters), cartoonifying images (to teach the real time objects), expressive text to speech recognition used for storytelling. The curriculum is carefully designed in the best interest of the child and its progress is carefully tracked and a detailed report of the child's progress and interests are available for the parents to view. Several machine learning algorithms and data analytics framework are used to achieve the above features.

The platform aims to teach the children various topics like numbers, addition and subtraction, shapes, patterns, measurements, and more. The games and artistic activities make math fun while giving young learners the practice they need to create a robust foundation for fulfilment. The unique drawing and painting program can provide children of all ages the chance to use lines, shapes and colours to make original works of art. Games, books, paint-by-number activities, and puzzles can teach children to memorize and use a variety of colours. The curriculum in our platform includes several highly entertaining and interactive activities, each teaching a specific learning

topic. These animated videos engage children while they learn. There are many jigsaw and cut-out puzzles designed to help develop problem solving and critical thinking skills. Puzzles also help to aid the children in remembering important ideas and skills in reading, math, science, art, social studies and music.

III. HARDWARE AND SOFTWARE REQUIREMENTS

A. Hardware Requirements

Processor	:	500 MHz Processor
RAM	:	512Mb
Hard Disk	:	10 GB
System type	:	64 – bit OS

B. Software Requirements

Operating system	:	Windows XP or Higher
Front End	:	React.js
IDE	:	Visual code
Framework	:	Django
Data Base	:	SQLite

IV. DIAGRAMS



Fig.1. Use Case

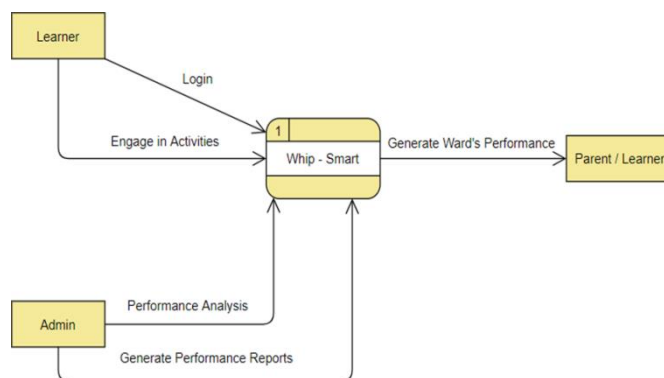


Fig.2. Data Flow Diagram (Level 0)

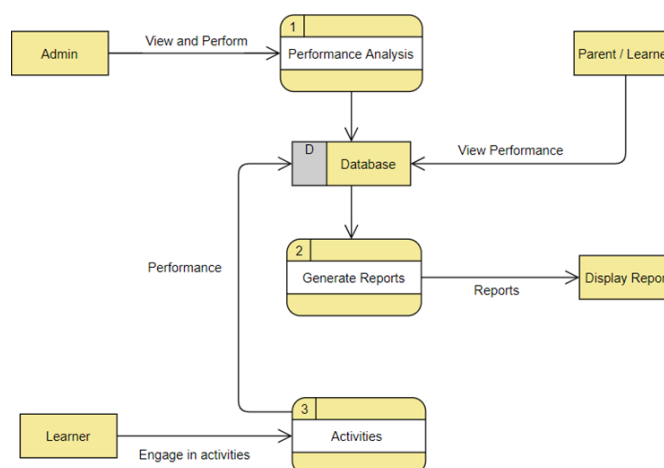
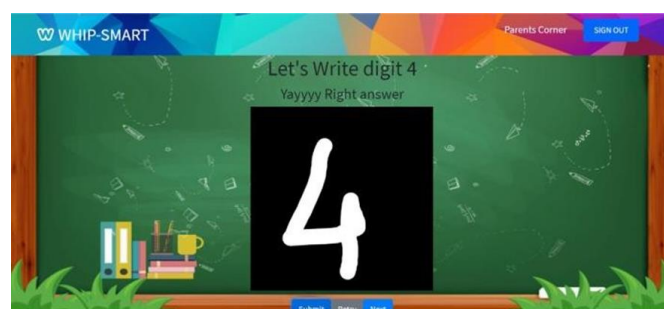


Fig.3. Data Flow Diagram (Level 1)

V. SYSTEM IMPLEMENTATION

A. UI Implementation

The UI is designed using reactjs. There are different levels designed to develop cognitive, listening, reading and writing skills. Parents can view their ward's performance and actively participate in their learning journey. React sketch library enables children to practice the digits. It captures the image format of the written digit and sends it for digit classification implemented using CNN.



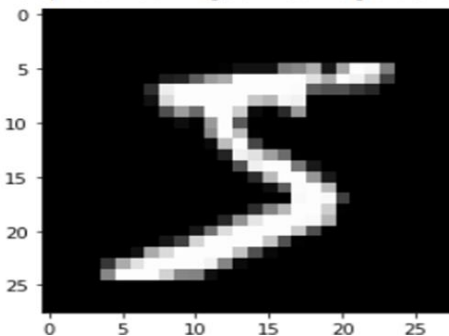
Numbers, alphabets, animals, stories, rhymes and so on are read aloud for the children using the text to speech synthesis which can be implemented using the library available in react called 'react-speech-kit'

B. Algorithm Implementation

The image that is saved in the frontend using the react- sketch library of Reactjs can be fed to the backend (Django) using Axios where the digit is classified using the CNN model. Convolutional neural networks work great for images/data that can be represented in grid format. We cannot directly feed the image to CNN model; it needs to be converted into the right format before we feed it to the neural network for classifying the digits.

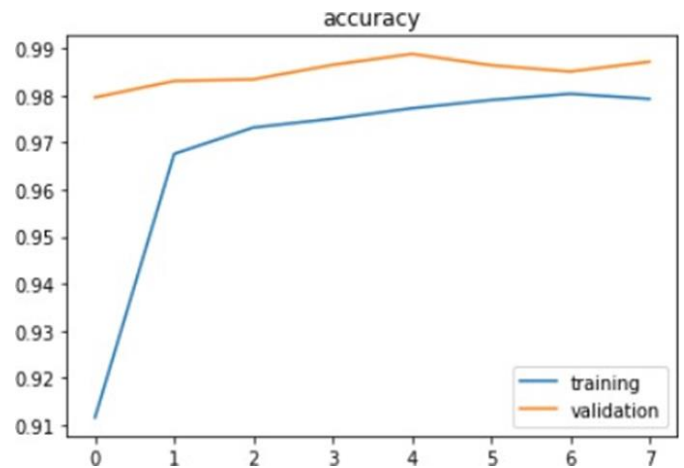
After pre-processing the image as mentioned before, we need to train the model using the `model.fit()` which is available in the keras library of python. Once the image is successfully classified it is sent back to the front end where the result is displayed.

```
<matplotlib.image.AxesImage at 0x7f3bee0452d0>
```



C. Accuracy

Accuracy of the built model can be found by using `accuary_score` which is available in `sklearn.metrics.y_test` and predicted variables which store the prediction are passed as a parameter to `accuary_score`.



VI. CONCLUSION

This project/software proposes to build a user friendly platform for kids to pursue their early education. It is always quite a difficult task to get the attention of kids to teach them. But by using our application the learning process for kids is made easy. There are various functionalities implemented to cater to the kid's busy mind and make learning fun and interactive.

VII. FUTURE SCOPE

This application mainly aims to provide quality education to children between ages 2-7. It proposes to build a user- friendly platform for kids to pursue their early education. This application can be further extended for ages beyond 7. Based on the kid's ability to comprehend the concepts, the level of complexity of questions can be auto generated. Every child has a unique level of understanding and it is important for an e-learning platform to identify this and cater to the child's needs accordingly. The current education system has a pre-defined curriculum which is usually not updated for a very long time and is generalised on the whole.

The child's progress can be tracked and recorded and the same report is available for parents to view. The child's interests and strengths can identified via Classification algorithms in Machine Learning. This

app aims to assist parents to simplify their busy lifestyle without compromising on their little one's development. It can also feature a customized daily calendar of the child's development, information on the child's health and customised weekly activities for the kid.

VIII. ACKNOWLEDGMENT

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