



NATIONAL LEVEL HACKATHON

KODIKON -3.0

NETWORKING – HACKATHON – MENTORSHIP

# Early Prediction of Autism Disorder

Autism Detection Redefined: 21st Century Solutions

THEME : Health Tech

PLATFORM PARTNER



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# PROBLEM STATEMENT

## Pioneering Early Autism Detection

Autism spectrum disorders (ASD) are a diverse group of conditions. They are characterized by some degree of difficulty with social interaction and communication. Typical patterns of activities and behaviours, such as difficulty with transition from one activity to another, a focus on details and unusual reactions to sensations.

Steps:

1. Define -

- The problem can be defined as the need for efficient and accurate methods of early detection to identify signs of autism in early childhood.
- The problem at hand is the delayed recognition and diagnosis of Autism Spectrum Disorder (ASD) despite its prevalence, affecting many children at the early stage.

# PROBLEM STATEMENT

- Measure :

- Net Worth: The global autism spectrum disorders market was valued at \$27.3 billion in 2021, and is projected to reach \$43.2 billion by 2031, growing at a CAGR of 4.6% from 2022 to 2031 according to AlliedMarketResearch
- The prevalence of ASD: According to a report by ETHealthWorld, about 18 million people in India are diagnosed with autism. About 1 to 1.5 percent of children aged two to nine years are diagnosed with ASD.

- Analyze :

- Complex nature of ASD: Ambiguity in deciding the correct name for the disease that the patient is facing due to wide range of symptoms.
- Comprehensive Assessment: Implement a multi-modal assessment approach that considers a range of behavioral and physical factors. This can help in characterizing the condition more accurately.

To solve the problem of early autism detection, a comprehensive approach that combines various elements, including data, technology, awareness, and collaboration, is required. Here's a detailed description of how this problem can be addressed:

- **Data Collection and Preparation:** This step focuses on assembling a diverse dataset of children's images, labeling and adding metadata, and standardizing image sizes and quality.
- **Machine Learning Model Development:** It involves the implementation of a Convolutional Neural Network (CNN) using Python and relevant libraries like TensorFlow, Keras, Numpy, and Pandas for classifying images to distinguish children with ASD from those without.
- **Data Augmentation and Preprocessing:** The dataset is enhanced using data augmentation techniques, ensuring diversity and preventing overfitting. Images are preprocessed through resizing, normalization, and center-cropping for uniformity.
- **Natural Language Processing (NLP) Component:** NLP is integrated to allow users to ask questions and receive informative responses within the web application, supported by a knowledge base.
- **Streamlit Web Application:** A user-friendly web application is created using Streamlit to facilitate interaction with the model. It includes an intuitive interface for uploading images and receiving predictions.

- **Why do you think your solution works?**

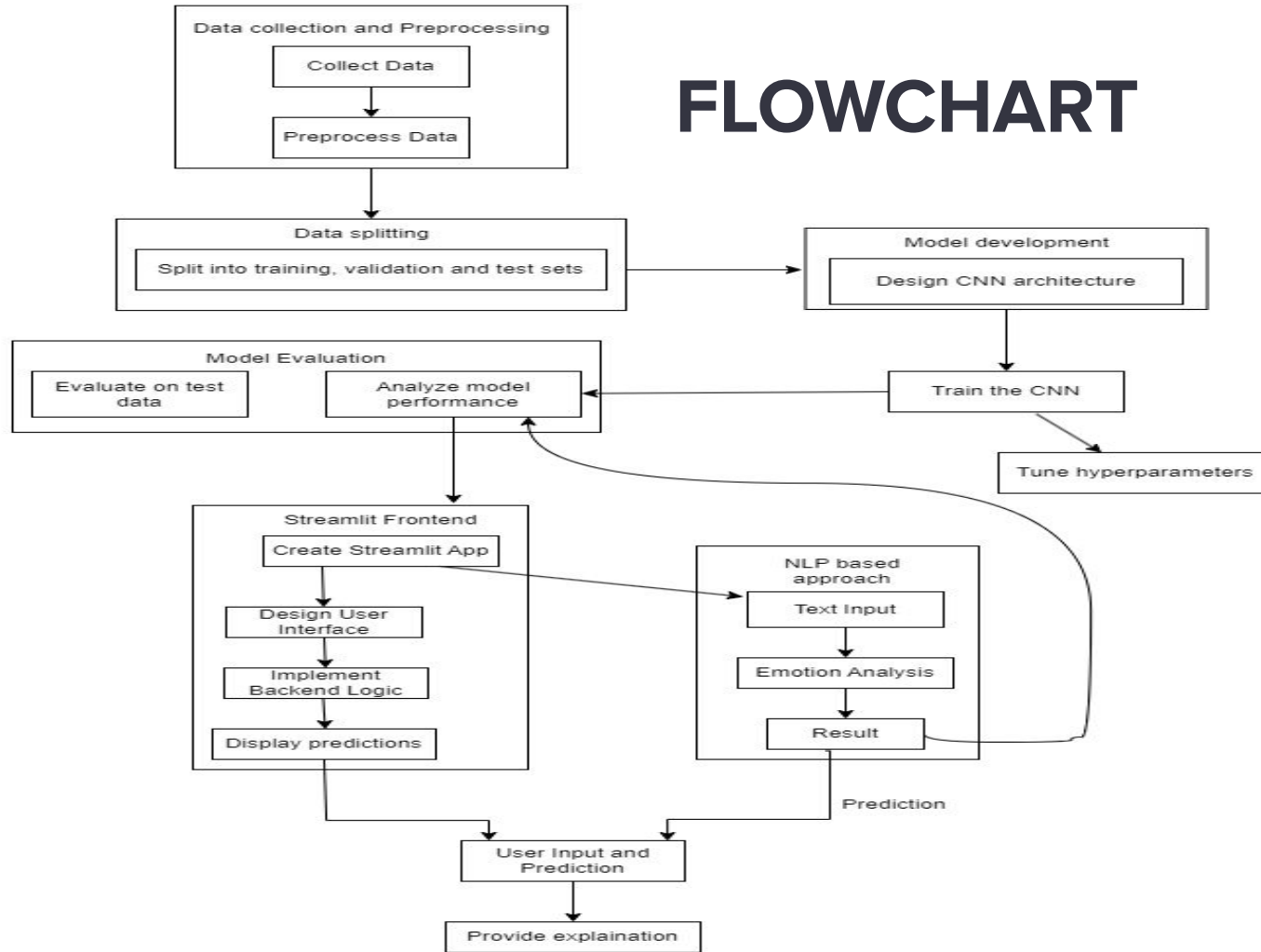
- The above proposed solution is effective because it integrates Convolutional Neural Networks (CNN) and Natural Language Processing (NLP) to comprehensively analyze visual and linguistic cues associated with ASD.
- This multi-model approach allows for the detection of subtle signs of ASD, increasing the likelihood of early intervention. User engagement is facilitated through NLP interaction, building trust and ensuring user participation.

- **Which part of the community do you wish to aim , i.e. the TARGET AUDIENCE?**

- **Healthcare Professionals:** The solution can assist pediatricians, child psychologists, and other healthcare practitioners.
- **Research and Medical Communities:** Researchers and medical professionals involved in autism studies and clinical practices can find value in the project.
- **Autism Patients:** While the primary focus is on the caregivers, professionals, and researchers, the project should ultimately benefit individuals with Autism. By enabling early detection and intervention, it can lead to better outcomes and improved quality of life for individuals with Autism.



# FLOWCHART



# SOLUTION

## EXPECTED RESULTS

An evidence-based web application for the early detection of Autism, provides a “safe space” for parents to explore their concerns in their own home, prior to raising these concerns with a professional and/or other family members, which can often act as a barrier to help-seeking. It has the potential to empower parents in communicating their concerns and support them in engaging their local, relevant, Healthcare professionals.



# TECH STACK

- **PROGRAMMING LANGUAGES:** Python
- **PYTHON MODULES:** numpy, pandas, matplotlib, keras , NLP, seaborn , tensorflow, CNN
- **FRONTEND:** Stream Lit
- **TOOLS USED:** VS Code , Jupyter Notebook
- **DOMAINS:** Machine Learning, Web development

- How do you envision your solution being of value to institutions, companies, NGOs, and other organizations ?
  - **Educational Institutions:** Schools can benefit from early autism detection by providing tailored support and resources to students with ASD, enhancing their learning experience.
  - **Government and Public Health Agencies:** Government agencies can incorporate the solution into public health initiatives to promote early detection and intervention for ASD, potentially reducing long-term healthcare costs.
- Do you anticipate the potential for generating revenue from your product?
  - **Licensing and Partnership:** Licensing the technology to healthcare institutions, clinics, or tech companies interested in using the system as part of their services or products.
  - **Corporate and Government Contracts:** Pursuing contracts with government agencies, public health initiatives, and corporate social responsibility programs to deploy the system at scale.