Fr. Conceicao Rodrigues College of Engineering

Father Agnel Ashram, Bandstand, Bandra –west, Mumbai-50

Department of Computer Engineering

PROJECT PROPOSAL TEMPLATE

Group Information:

Roll No	Student Name	Div A/ B
9924 (Group Leader)	Ronit Naik	A
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TITLE OF THE PROJECT:
Smart System for Early Detection of Autism Using Brain Scan Images

BROAD AREA (E.g. IoT, Machine Learning, Computer Vision, System Security etc.):
Artificial Intelligence, Machine Learning, Medical Imaging

Category of the Project (Product based, Application based, or Research based): Application Based

ABSTRACT (maximum 300 words):

Autism is a condition that affects how children communicate and interact. About 1 in 160 children worldwide has autism. Early detection is important because it helps children get the right support sooner, improving their lives.

Right now, diagnosing autism takes a long time and depends on observing behavior, which can lead to delays and different opinions among doctors.

Our project aims to create a smart system that uses brain scan images (fMRI) to help detect autism faster. The system will clean the images, find important patterns, and use deep learning to analyze them.

We also plan to build a simple website where doctors can upload brain scans and get quick results. This tool can support faster diagnosis, especially in places without autism specialists, and help children get early care and support.

MOTIVATION (maximum 100 word):
Many children with autism are diagnosed very late, sometimes after age 4-5, which delays important early treatment. Current methods are slow and depend heavily on doctor's experience. We want to create a fast, accurate, and easy-to-use tool that can help any doctor detect autism early, even if they are not autism specialists. This will help more children get timely support and improve their quality of life.

PROBLEM STATEMENT:
How can we create a simple, fast, and accurate computer system that helps doctors detect autism in children using brain scan images?

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SDGs Mapped:

- SDG 3: Good Health and Well-being - Helping children get better healthcare through early autism detection
- SDG 4: Quality Education - Helping schools plan better education for children with autism
- SDG 9: Innovation - Using new technology to solve healthcare problems
- SDG 10: Reducing Inequality - Making autism diagnosis available to everyone, not just in big hospitals

OBJECTIVES:

- Enhance Brain Scans: Clean and improve the quality of brain images.
- Detect Autism Patterns: Identify key features linked to autism.
- Select Key Features: Use only the most important patterns for efficiency.
- Train AI Model: Build a smart system using thousands of brain scans.
- Test Accuracy: Evaluate the system with real data.
- Build Web App: Create a simple tool for doctors to upload scans and get results.

METHODOLOGY (TENTATIVE IF ANY):

Step 1: Collect Brain Scan Data
Use the ABIDE-I public database with 1,112 brain scans — 539 from children with autism and 573 from typical children. All scans are approved for research.

Step 2: Preprocess and Enhance Images
Clean the brain scans by removing noise and blurriness. Improve brightness and contrast for clarity, and resize all images to a standard 128x128 pixels.

Step 3: Extract Key Features
Analyze each image to identify textures, shapes, and patterns in different brain regions. This process gives around 8,624 unique measurements per scan.

Step 4: Select Most Useful Features
Apply feature selection algorithms to reduce the number of measurements to the top 800 most relevant ones, improving speed and accuracy while removing irrelevant data.

Step 5: Train the AI Model
Build a neural network that learns to detect autism by studying thousands of brain scans. The model gradually learns to recognize subtle patterns linked to autism.

Step 6: Test and Deploy the System
Evaluate the system on unseen brain scans to check its accuracy. Create a simple, user-friendly website where doctors can upload scans and receive instant, understandable reports.

HARDWARE / SOFTWARE REQUIREMENTS:

Software (Computer Programs):

- Python - Programming language for building the system
- TensorFlow - For creating artificial intelligence
- OpenCV - For processing images
- Flask - For building the website
- Google Colab - Free online platform for development

Hardware (Computer Equipment):

- Computer with GPU - For faster AI training (can use Google Colab for free)
- 8GB RAM minimum - For running the programs smoothly
- 50GB Storage - For storing brain scan data and models
- Internet Connection - For accessing online resources

INNOVATIVENESS:

Instead of relying on a single AI system, we use three different models that analyze brain scan images in unique ways and combine their results for better accuracy. We developed a special image enhancement technique to make the scans much clearer. Our system also uses intelligent feature selection to automatically pick the most important information and discard irrelevant data. This approach achieves a high accuracy while using significantly less computing power than other methods. To make it accessible, we built a simple website that any doctor can use without technical knowledge. The entire system is designed for real-world application in hospitals and clinics, not just for research purposes.

SOCIETAL RELEVANCE? (e.g. Health, Agriculture, Environment, Smart Solution Etc…)

Health Benefits

Fast, accurate diagnosis in minutes, usable in small clinics, and supports non-specialist doctors.

Educational Impact

Enables early intervention, better school planning, and quicker family access to support

Smart Technology

Applies AI to real problems, cuts repeated doctor visits, and can scale to help millions.

Economic Benefits

Reduces healthcare costs, boosts individual productivity, and improves overall system efficiency.

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