# AutismVision: Image-Based Detection of Autism Using CNN

**Overview**  
Autism Spectrum Disorder (ASD) is a lifelong neurodevelopmental condition that affects communication and behavior. Early diagnosis plays a critical role in managing symptoms and supporting individuals. This project, AutismVision, aims to develop an image-based autism detection model using Convolutional Neural Networks (CNN), specifically VGG16 and VGG19 architectures.

**Motivation & Objective**  
Prompted by rising ASD prevalence—1 in 59 children in the U.S.—and the challenges in early diagnosis, our team aimed to build a binary classifier to distinguish between autistic and non-autistic children using facial images. The ultimate goal is to support early screening tools and offer NGOs a model to build upon.

**Dataset & Methodology**  
The dataset, publicly available, contains facial images of autistic and non-autistic children labeled as 0 and 1, respectively. Data was preprocessed, augmented, and split into training, validation, and test sets. VGG16 and VGG19 models were implemented on Google Colab using Python, Keras, and TensorFlow. Each model was trained with hyperparameter tuning, dropout layers, and sigmoid activation for binary classification.

**Implementation**  
Both models were trained on approximately 2,538 images. Preprocessing included rotation, shear, zoom, and flipping to enhance generalization. Final predictions were validated using metrics such as accuracy, precision, sensitivity, and specificity.

**Results**  
- VGG16: 84.33% accuracy, 84% precision, 84.56% sensitivity, 84.10% specificity  
- VGG19: 84% accuracy, 86.6% precision, 82.27% sensitivity, 85.91% specificity  
Predictions were verified through confusion matrices, showing robust classification ability.

**Conclusion**  
Our CNN-based approach effectively classifies ASD from facial images with over 84% accuracy. VGG19 offers better precision, while VGG16 slightly outperforms in sensitivity. This tool could assist healthcare professionals and organizations in early ASD screening, offering a scalable and efficient solution for diagnosis support.

**Contributors**  
Siddharth Bansal, Dev Vishnu Srivastav, Hitanshu Singh  
Mentor: Saurabh Srivastav