Project Design Phase-I
Solution Architecture

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Team ID	PNT2022TMID592324
Project Name	Project – Detection Of Autistic Spectrum Disorder
Maximum Marks	4 Marks

Solution Architecture:

Predicting autism disorder is a complex task that often involves a multidisciplinary approach. A solution architecture for autism disorder prediction should integrate various data sources, employ machine learning techniques, and prioritize data privacy and ethics. Here's a high-level architecture for such a system:

1. Data Collection and Integration:-

- Collect diverse data sources, including medical records, genetic information, behavioural assessments, and demographic data.

- Integrate data from different sources into a centralized data repository. Ensure data is de-identified and anonymised to protect patient privacy.

2. Data Preprocessing:-

- Clean and preprocess data to handle missing values, outliers, and inconsistencies.

- Normalize and standardize features to ensure that the data is suitable for machine learning algorithms.

- Feature engineering: Create relevant features or representations from the data, e.g., extracting features from behavioral assessments.

3. Machine Learning Models:-

- Employ various machine learning algorithms for prediction, such as:

  - Logistic Regression

  - Random Forest

  - Support Vector Machines

  - Deep Learning (e.g., neural networks)

- Train models on historical data, using a subset of the data for training and a separate set for validation and testing.

- Hyperparameter tuning: Optimize the model parameters to achieve the best performance.

4. Model Evaluation:-

- Use metrics such as accuracy, precision, recall, F1-score, and ROC AUC to evaluate model performance.
- Implement cross-validation to ensure the model generalizes well to new data.
- Consider model explainability and interpretability to gain insights into the predictions.

5. Ethical Considerations:-

- Implement privacy and security measures to protect sensitive patient data.
- Address potential biases in the data and models to ensure fairness and equity.
- Ensure compliance with data protection regulations and ethical guidelines.

6. Deployment and Integration:-

- Deploy the trained model in a secure and scalable environment, such as a cloud-based server or on-premises infrastructure.
- Integrate the model with healthcare systems for real-time or batch predictions.
- Develop APIs or interfaces for easy integration with other applications and systems.

7. Continuous Monitoring and Feedback:-

- Continuously monitor the model's performance in a production environment.
- Collect feedback from healthcare professionals and users to improve the model over time.

8. Interpretability and Explanation:-

- Implement techniques for model explainability to make predictions more understandable to clinicians and patients.
- Provide insights into the features that contribute to a particular prediction.

9. User Interfaces:-

- Develop user interfaces for healthcare professionals to input patient data and receive predictions.

- Design interfaces that present results in a clear and understandable manner.

10. Education and Training:-

- Offer training to healthcare professionals on how to use the system and interpret its predictions.

- Promote awareness and understanding of the system within the healthcare community.

11. Research and Collaboration:-

- Collaborate with research institutions and organizations to continually improve the model and share findings with the broader scientific community.

Example - Solution Architecture Diagram:

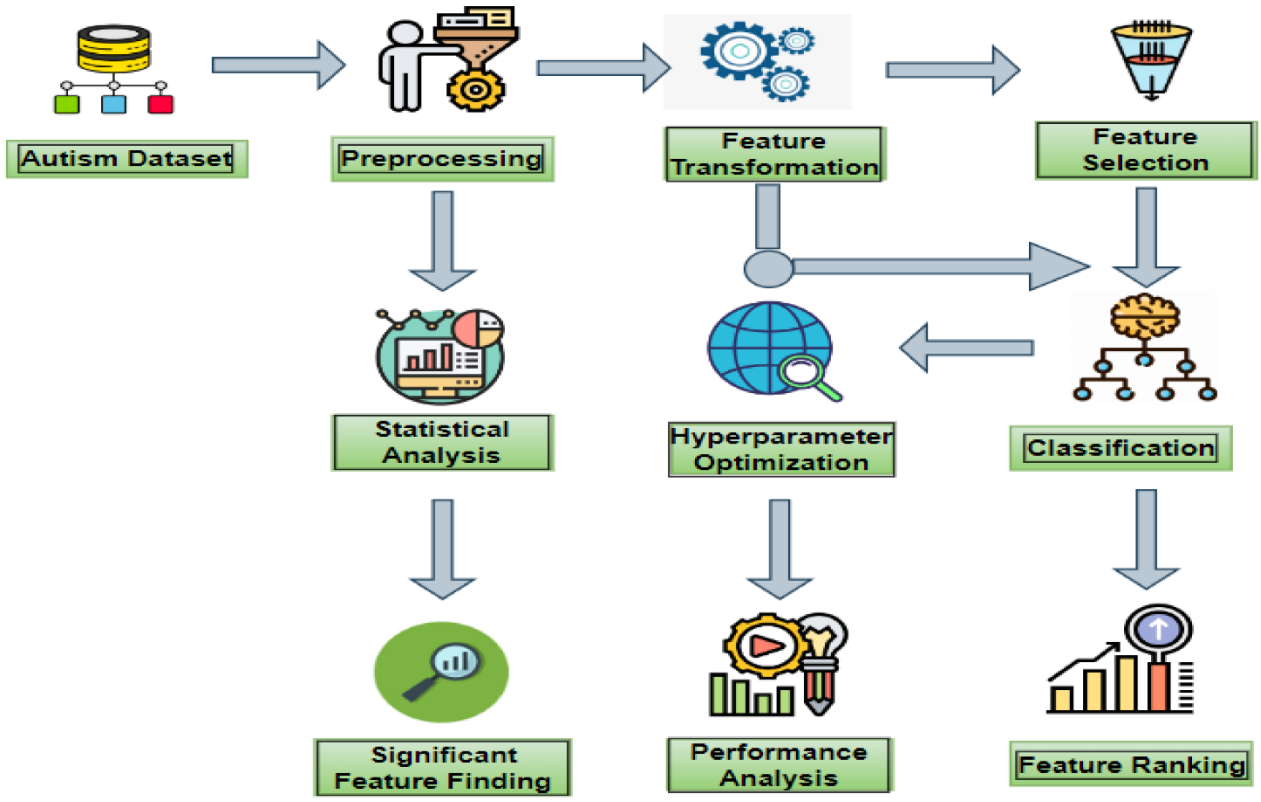

Figure 1: Architecture and data flow of Detection Of Autistic Spectrum Disorder

Reference: https://aws.amazon.com/blogs/industries/voice-applications-in-clinical-research-powered-by-ai-on-aws-part-1-architecture-and-design-considerations/