

Project Idea : Brain Tumor Detection Using MRI Images

Week 1: Data Collection and Preprocessing

- **Tasks:**
 - **Data Collection:** Acquire MRI image datasets (e.g., from public sources like Kaggle, or medical repositories such as TCIA).
 - **Data Preprocessing:** Preprocess the MRI images (resize, normalize, and possibly augment the images for better training results). Techniques like denoising and contrast enhancement might be useful.
 - **Tools:** Python (Pandas, NumPy), OpenCV, TensorFlow/Keras.
- **Deliverables:**
 - Cleaned and preprocessed MRI dataset.
 - Data preprocessing notebook documenting all steps.

Week 2: Data Science and Machine Learning

- **Tasks:**
 - **Exploratory Data Analysis (EDA):** Analyze the MRI dataset to understand the distribution of tumor types, sizes, and locations.
 - **Data Visualization:** Visualize the distribution of MRI images based on tumor presence, types of tumors, and pixel intensity. Use plots such as histograms, boxplots, and heatmaps to showcase the data's characteristics.
 - **Tools:** Python (Scikit-learn, TensorFlow/Keras, Matplotlib, Seaborn).
- **Deliverables:**
 - EDA report with Data visualizations (e.g., histograms, class distribution) to make it easier to understand the data and how it is correlated.

Week 3: Model Building and Azure Integration

- **Tasks:**
 - **Model Development:** Build and evaluate basic classification models (CNNs) to detect tumors (binary classification: tumor/no tumor).
 - **Azure AI Fundamentals:** Deploy the trained model on Azure for real-time detection and scale the application.
 - **Tools:** Azure Machine Learning, Python (TensorFlow/Keras, PyTorch, Scikit-learn,).
- **Deliverables:**
 - Initial CNN model with performance metrics.
 - Deployment setup using Azure Machine Learning.

Week 4: MLOps, GANs, and Final Presentation

- **Tasks:**
 - **MLOps:** Use MLflow to track and manage the machine-learning models throughout the project.
 - **Data Augmentation with GANs:** Implement a Generative Adversarial Network (GAN) to create synthetic MRI images for further training and to increase the dataset size.
 - **Final Report and Presentation:** Prepare a final report and presentation covering data preprocessing, model development, GANs, and Azure deployment.
 - **Tools:** MLflow, Python (TensorFlow/PyTorch for GANs), Azure services.
- **Deliverables:**
 - Deployed tumor detection model with GAN-generated MRI images.
 - Final report and presentation summarizing the project's work.