LAYERWISE RELEVANCE PROPAGATION (LRP) ON MRI DATA

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Brain tumors are complex. There are a lot of abnormalities in the sizes and location of the brain tumor(s). This makes it really difficult for complete understanding of the nature of the tumor. Also, a professional neurosurgeon is required for MRI analysis. Often times in developing countries the lack of skillful doctors and lack of knowledge about tumors makes it really challenging and time-consuming to generate reports from MRI. So an automated system on Cloud can solve this problem.

Brain Tumor Prediction Model is a model built using deep learning architecture, specifically VGG16-based convolutional neural network (CNN), to make predictions about the presence of brain tumors based on input MRI images. When the model makes a prediction, Local Relevance Propagation (LRP) is employed to and visualize the regions of the MRI scan that influences the most for the model's prediction. The visualization helps us to understand which areas (features) in the brain scan contributes the most for the outcome.

EXPLAIN BRAIN TUMOR PREDICITON MODEL

As a doctor explains the diagnosis to a patient

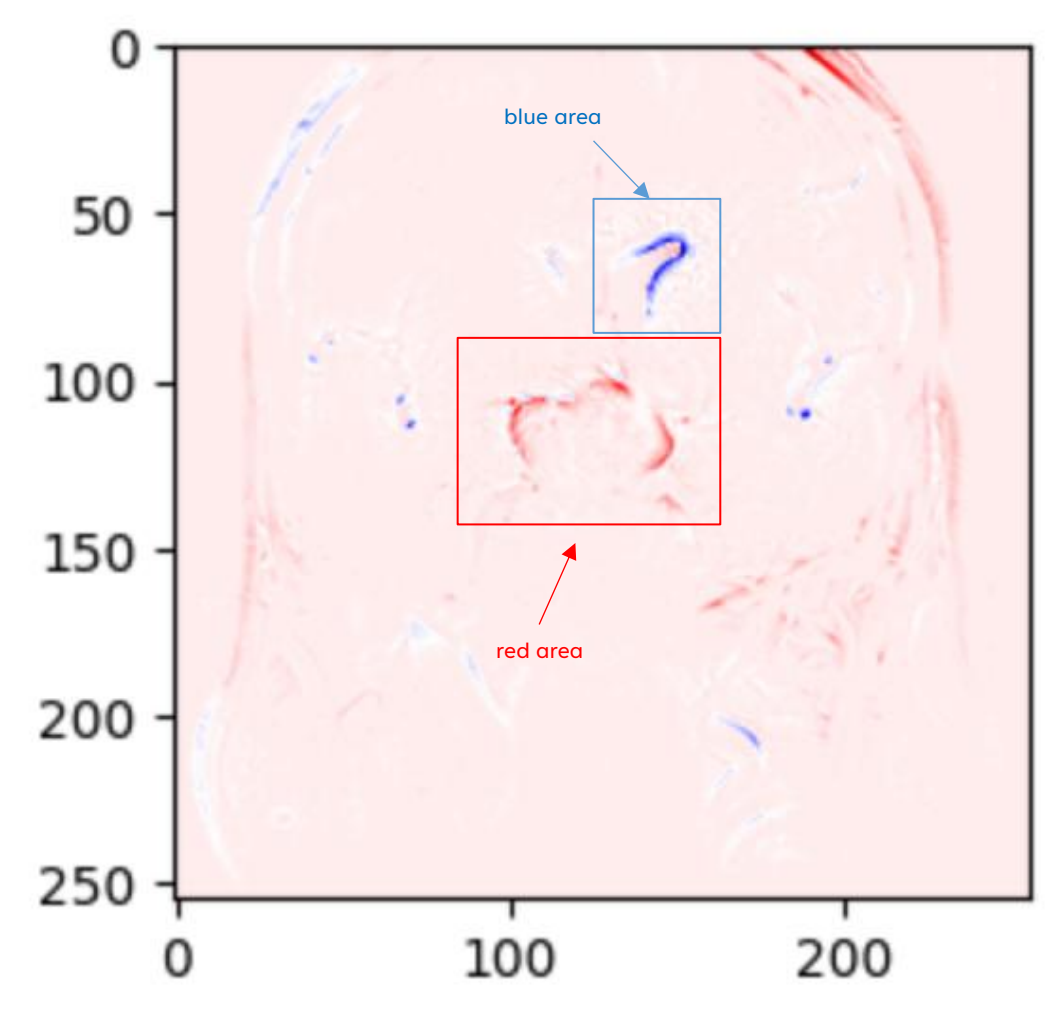


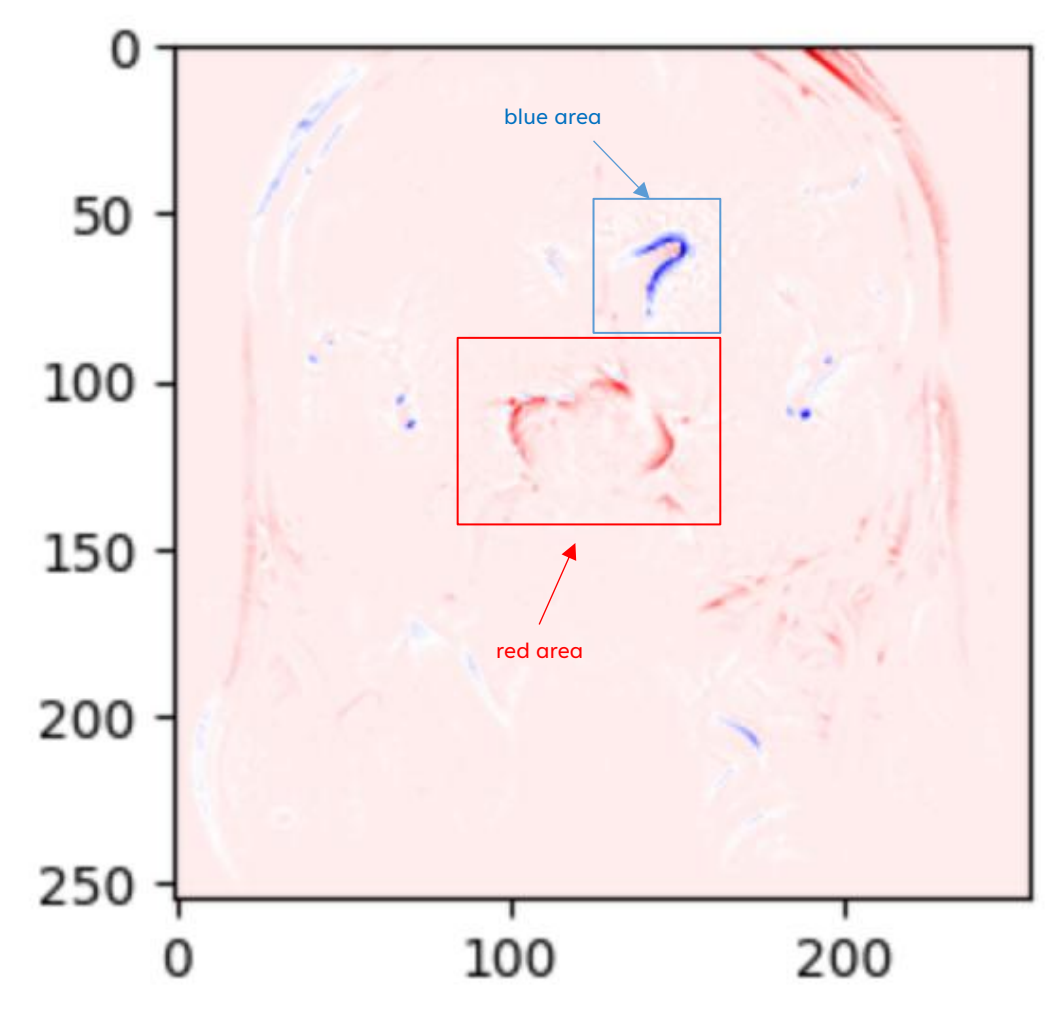
Figure shows the prediction of brain tumor for one sample (patient). The color coded areas which are red and blue in the figure represents the relevance of the areas which contributes to the model's decision-making.

- Red area indicates the add score, meaning it contributes to increase the probability for brain tumor.
- Blue area indicates the minus score, meaning it contributes to decrease the probability for brain tumor.

Based on the prediction, there are red area located at the center. This means that there is potential brain tumor in that area. The doctor can advise the patient for further steps such as follow-up tests after that proceed with treatment based on the condition and also considering the individual differences.

EXPLAIN BRAIN TUMOR PREDICITON MODEL

As a data scientist explains to a doctor



Brain Tumor Prediction Model is a model that can assist doctors and medical experts to identify relevant features that influences the model's prediction. Layerwise Relevance Propagation (LRP) is a technique we used to interpret the model's prediction by identifying relevant features in the input data.

Analysis:

LRP generates a heatmap that visually represents the relevance of each pixel in contributing to the model's prediction. This visualization is crucial for understanding which parts of the input image influenced the model's decision. In this case, the red areas indicate features that significantly contribute to the model's decision.

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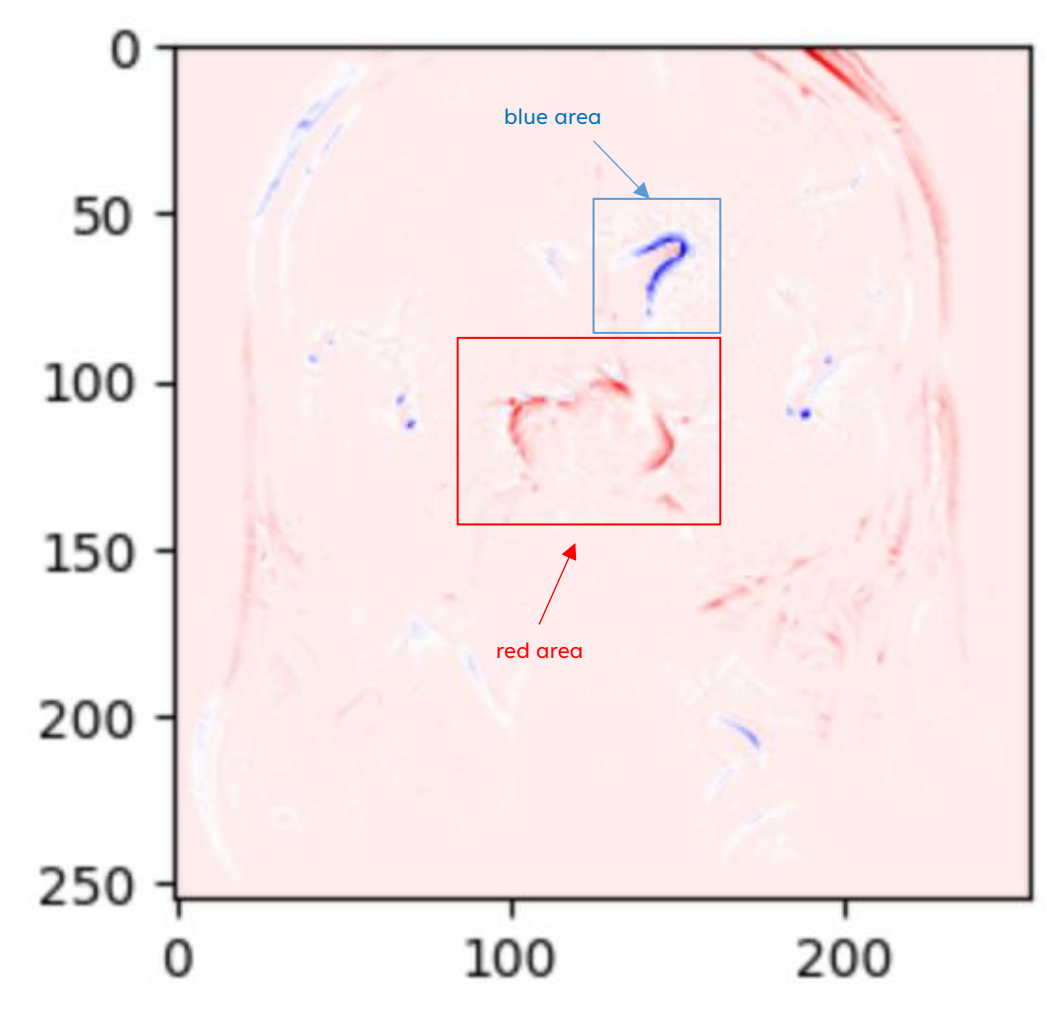

Red areas:

Red areas suggests that the model identified patterns in the MRI scan that are indicative of potential tumor.

Limitations:

As an AI model, false positives and/or false negatives are possible to occur, hence validation is encouraged to validate the model's predictions.

For further confirmation on the model's prediction, the doctor can conduct follow-up tests/diagnosis on the patient, and followed with treatment procedures if necessary.