The aim of this study is to segment brain tumors from MRI images and model them in three dimensions using machine learning. This project can be used in the diagnosis and analysis of brain tumors, preoperative planning, patient monitoring, and the education of medical students.

For tumor segmentation, the AGUnet architecture was utilized. It combines a fully-convolutional Siamese network for annotating regions with a U-net for segmentation.

**Dataset:** The training data is made of 2,134 MRI volumes originating from 14 different hospitals, and one public challenge. And the test data is made of 189 MRI volumes provided by Hacettepe University Faculty of Medicine.

**Methodology**

**Results**

**Confusion Matrix**

<table>
<thead>
<tr>
<th></th>
<th>GROUND TRUTH</th>
<th>GROUND TRUTH VS SEGMENTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TUMOR</td>
<td>NOT TUMOR</td>
</tr>
<tr>
<td>TUMOR</td>
<td>True Positive</td>
<td>False Positive 1.07%</td>
</tr>
<tr>
<td></td>
<td>False Negative0.014%</td>
<td>True Negative 98.7%</td>
</tr>
</tbody>
</table>

**Evaluation Metrics**

- Dice coefficient: 88.8%
- Precision: 80.5%
- Recall: 98.7%
- Accuracy: 99.8%

**References**


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