

Sprint 1:

RSNA-MICCAI Brain Tumor Radiogenomic Classification

Team Members: Rahaf Alharbey

Jiawei Zhao

Shuyi Fan

Zhaowen Zhou

Contents

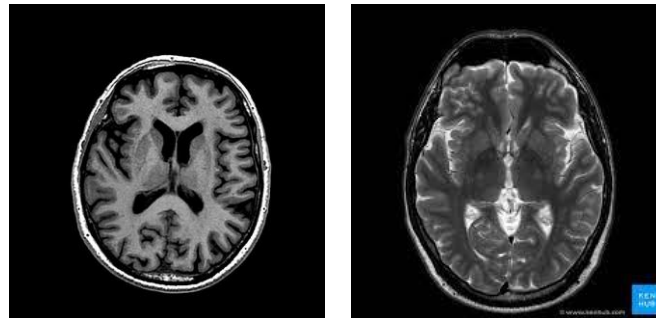
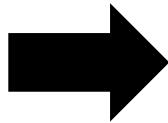
1. Product mission
2. Comprehensive Literature Review
3. MVP & MVP User Stories
4. Technologies

Background

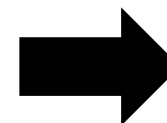
- A brain tumor is an aggressive type of cancer that can be very difficult to cure
- MRI and some other **imaging tests** are often used to diagnose brain tumors
- Need surgery to **extract a tissue sample** which can take several weeks



Diagnose



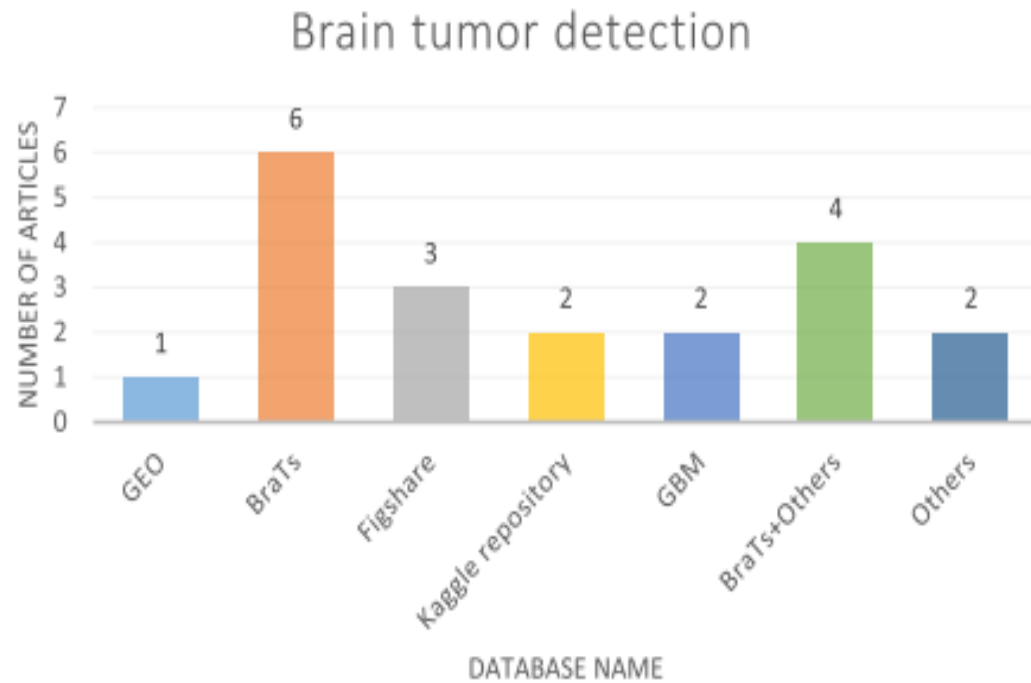
MRI



Surgery & Test

Background

Data set

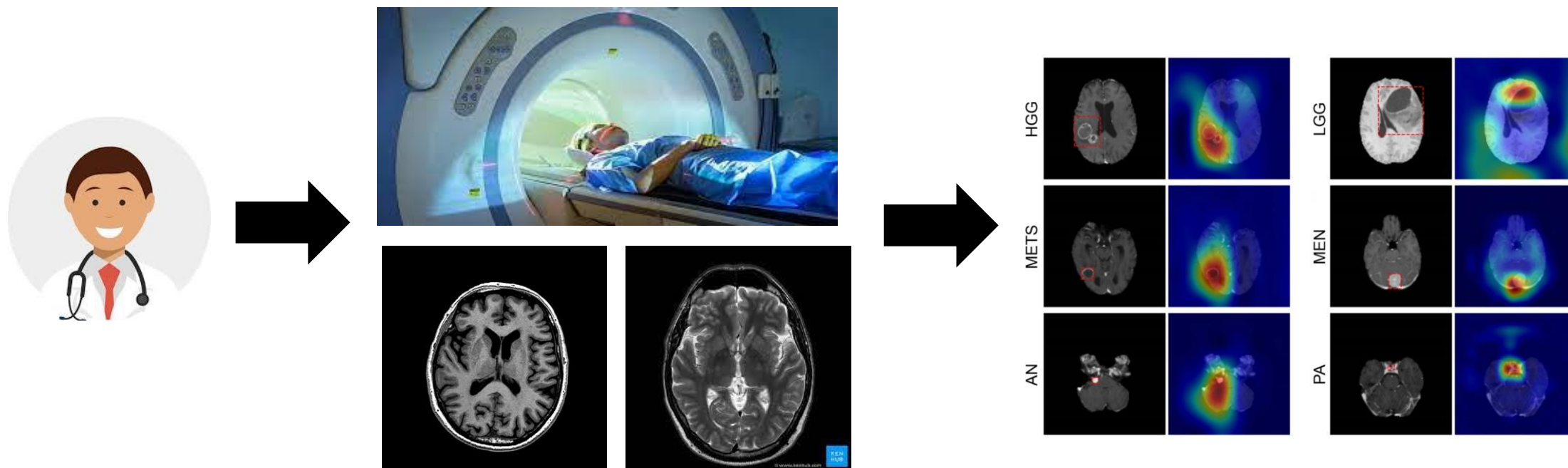


Quality of recent work

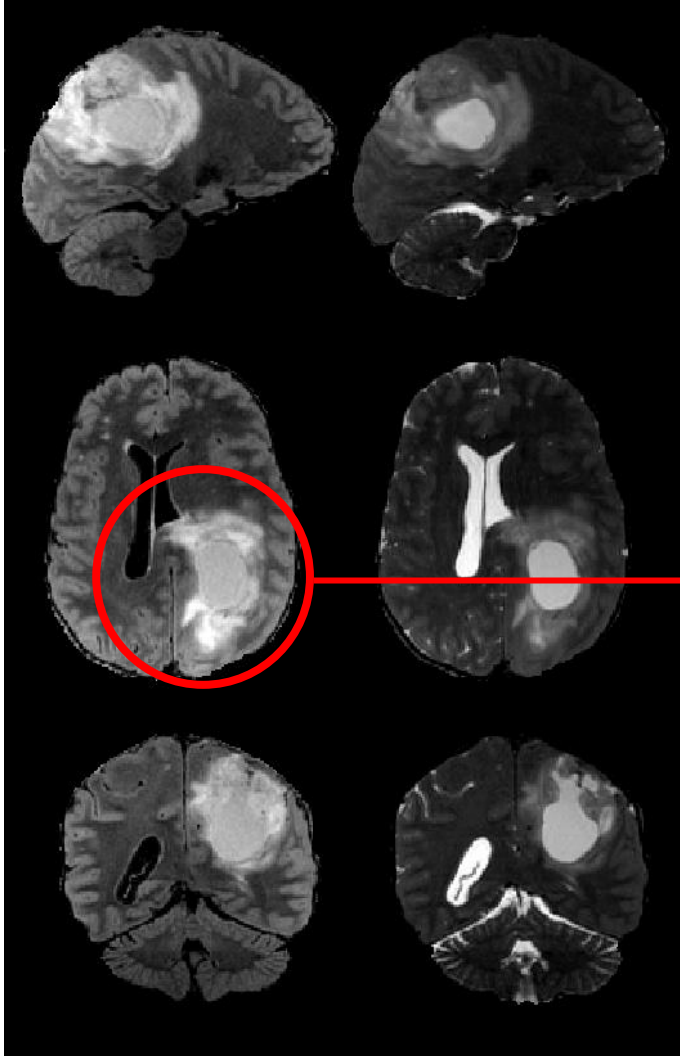
Year	Input Data	Model	Accuracy (%)
2018	MRI	CNN+SVM	89
2018	CT & fMRI	CNN	93
2019	CT	CNN+LSTM	88
2021	CT	CNN (Capsule net)	94.5
2021	MRI	CNN (NASnet)	95.4
2021	MRI	CNN (U net)	96.9

Product Mission

- Developed AI model will help to **early and fast detection** of tumors In brain.



MVP user stories

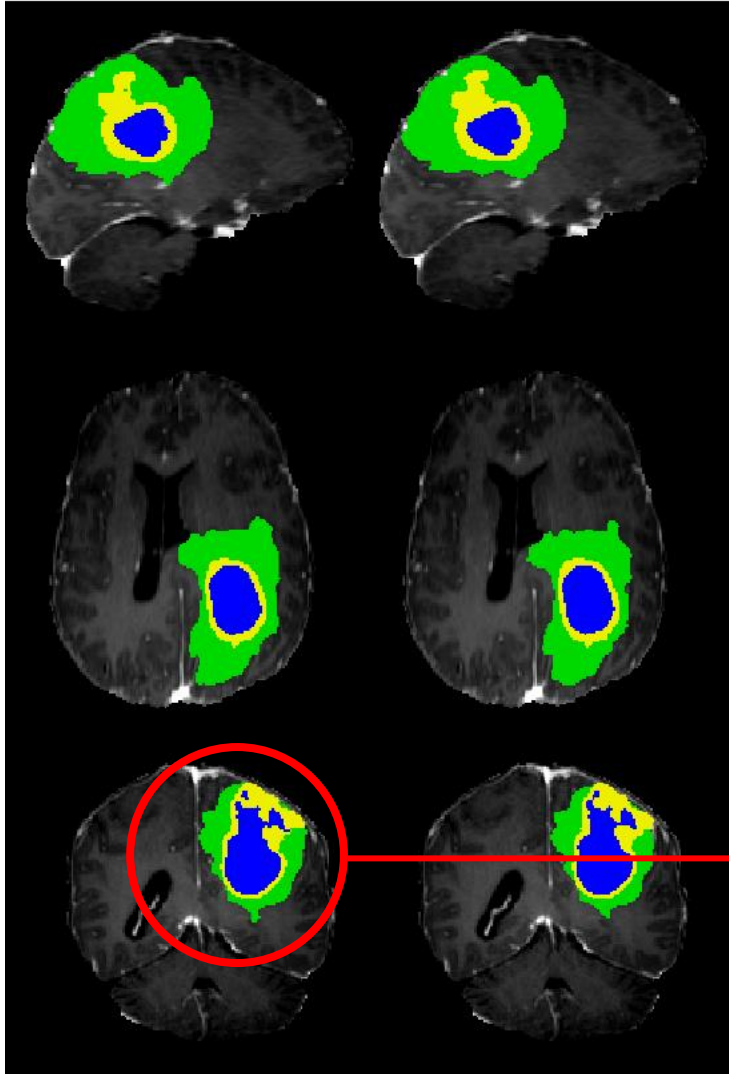


As a doctor,

1. Already got the MRI scans, want to know whether if patients **have brain tumor or not**;
2. Already find tumor in MRI, want to make sure if it is **cancerous or not**;

tumor?
cancerous or benign?

MVP user stories

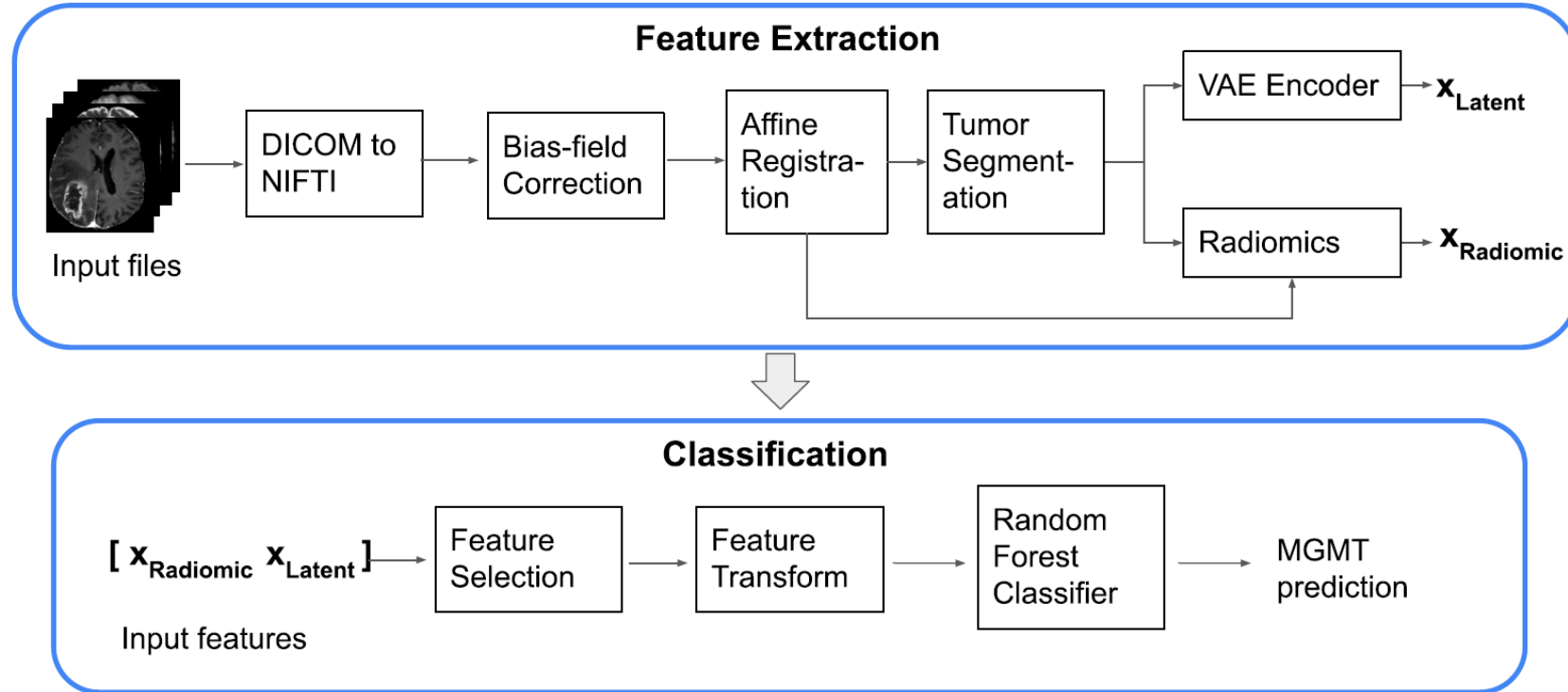


As a doctor,

1. Already got the MRI scans, want to know whether if patients **have brain tumor or not**;
2. Already find tumor in MRI, want to make sure if it is **cancerous or not**;
3. Make sure it's cancerous, want to recognize the **tumor's type** (location);
4. Make sure it's cancerous, want to know the **status of the tumor**.

tumor's type? status?

MVP user stories



As a student / researcher,

1. learn classify model in their own field, want to know **details of our model**;
2. Already have their own model, and want to **compare their products with ours**;

MVP

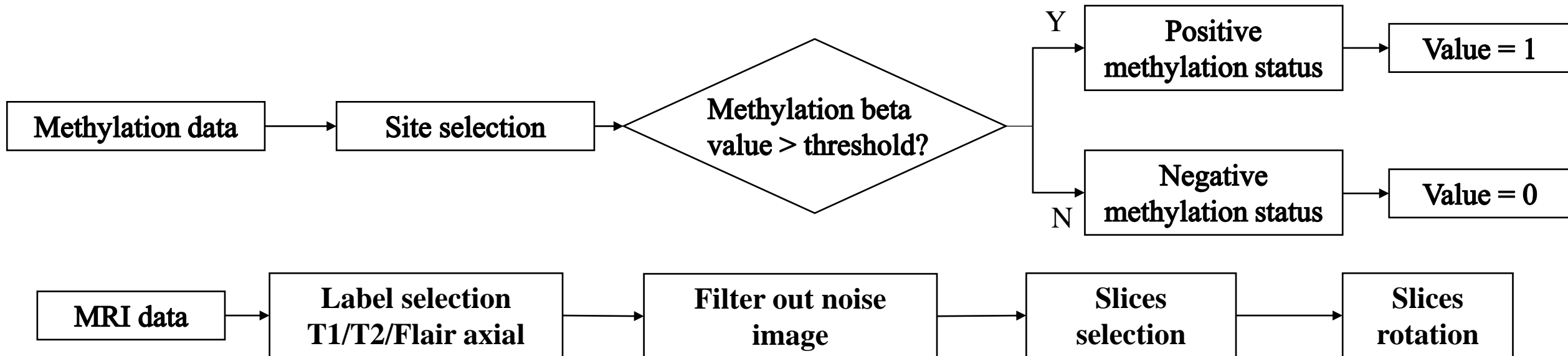
The product should have the following functions:

- 1. recognize whether patient has brain tumor or not;**
- 2. make sure whether the tumor is cancerous or not;**
- 3. find Tumor's type (location);**
- 4. get the status of the tumor.**
- 5. supply code and dataset of our product.**

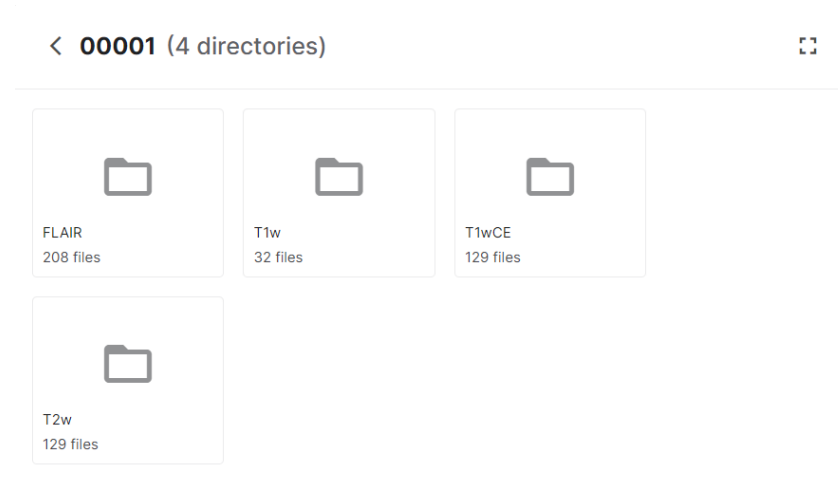
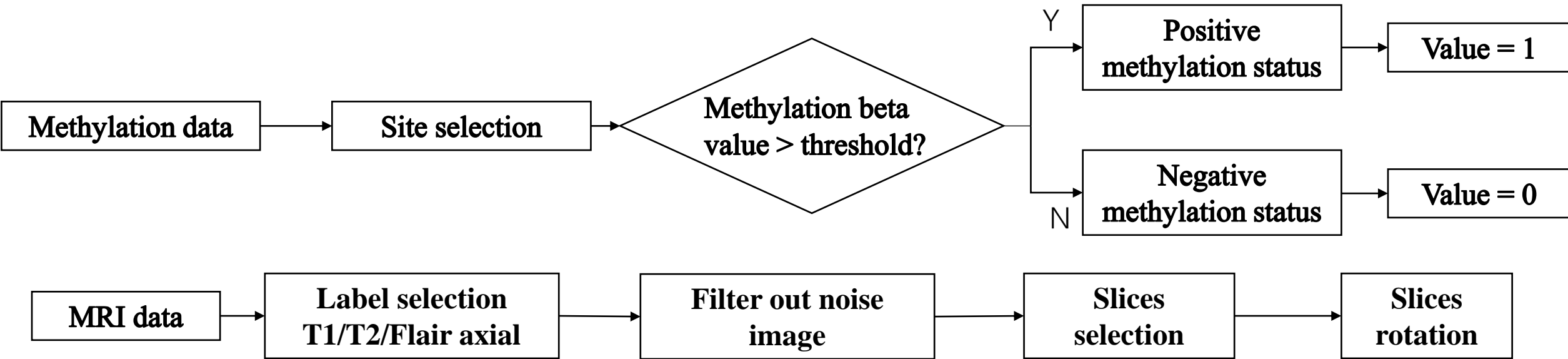


- 1. Users could input imaging;**
- 2. Output tumor's type and status;**
- 3. Open source**

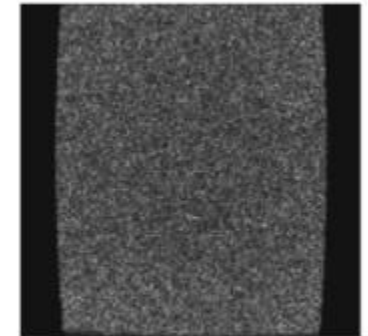
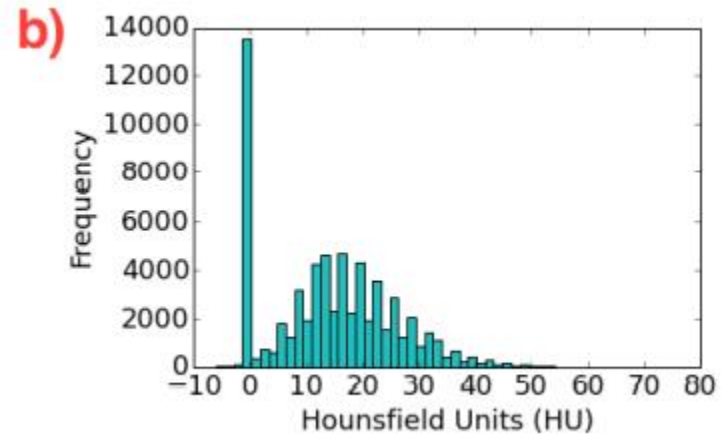
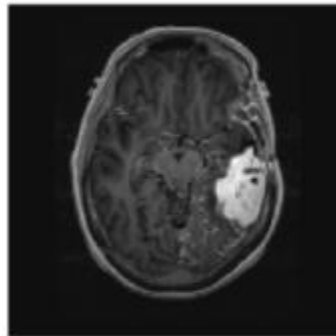
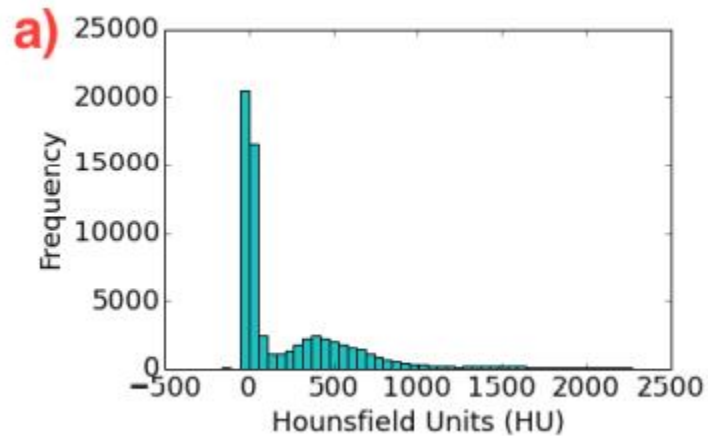
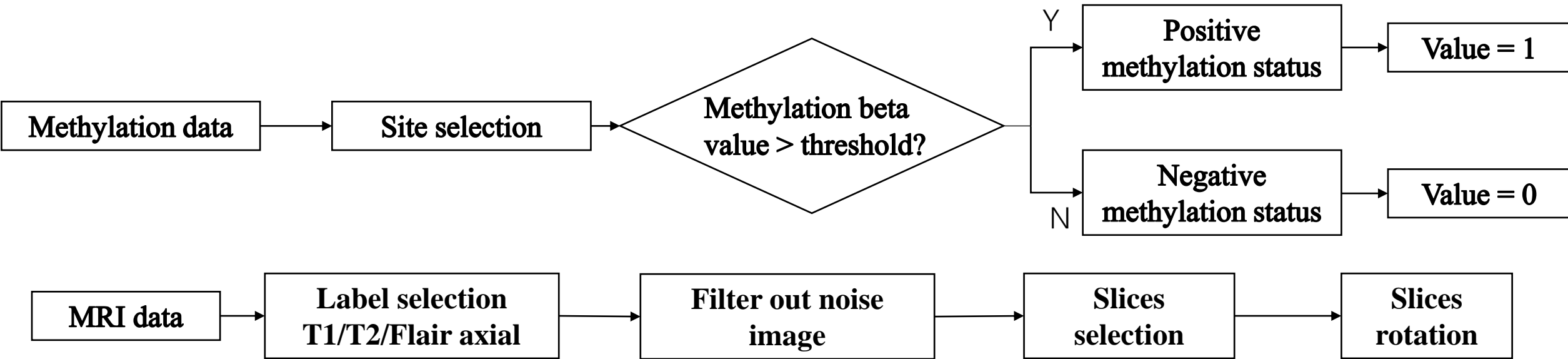
Technologies



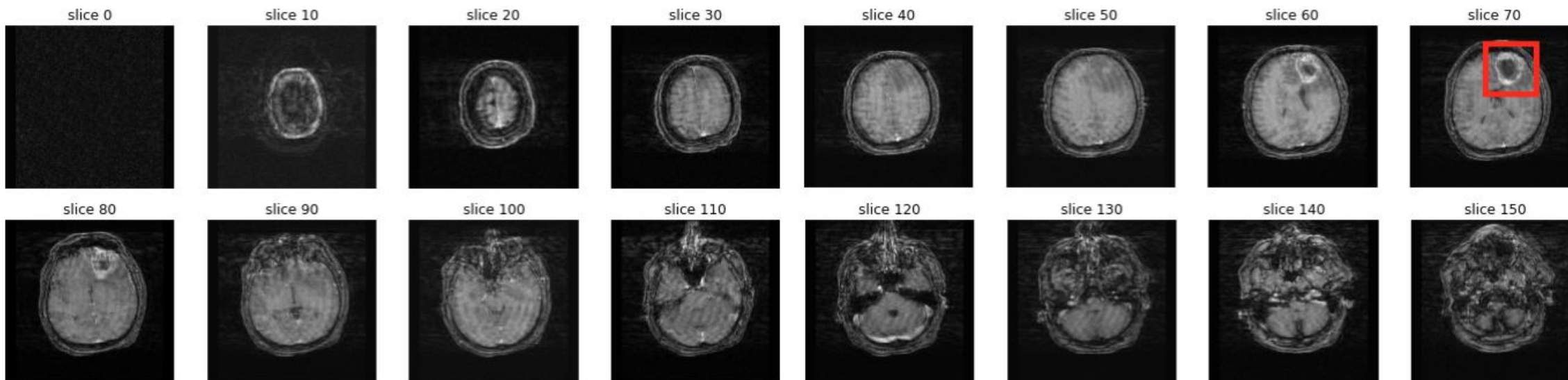
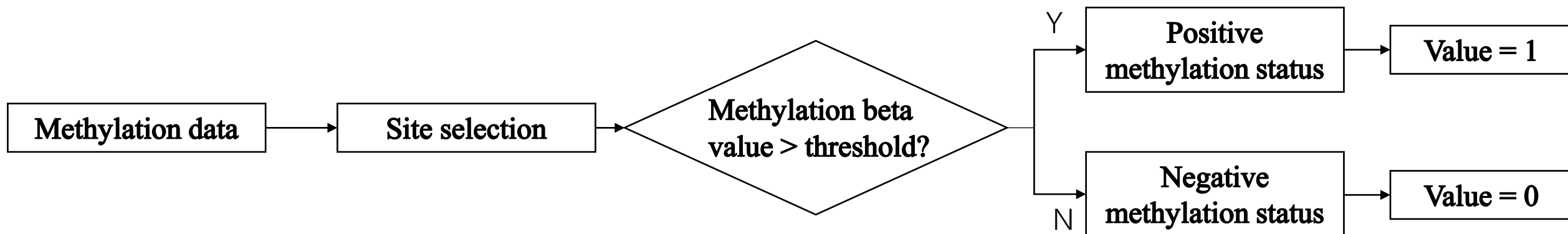
Technologies



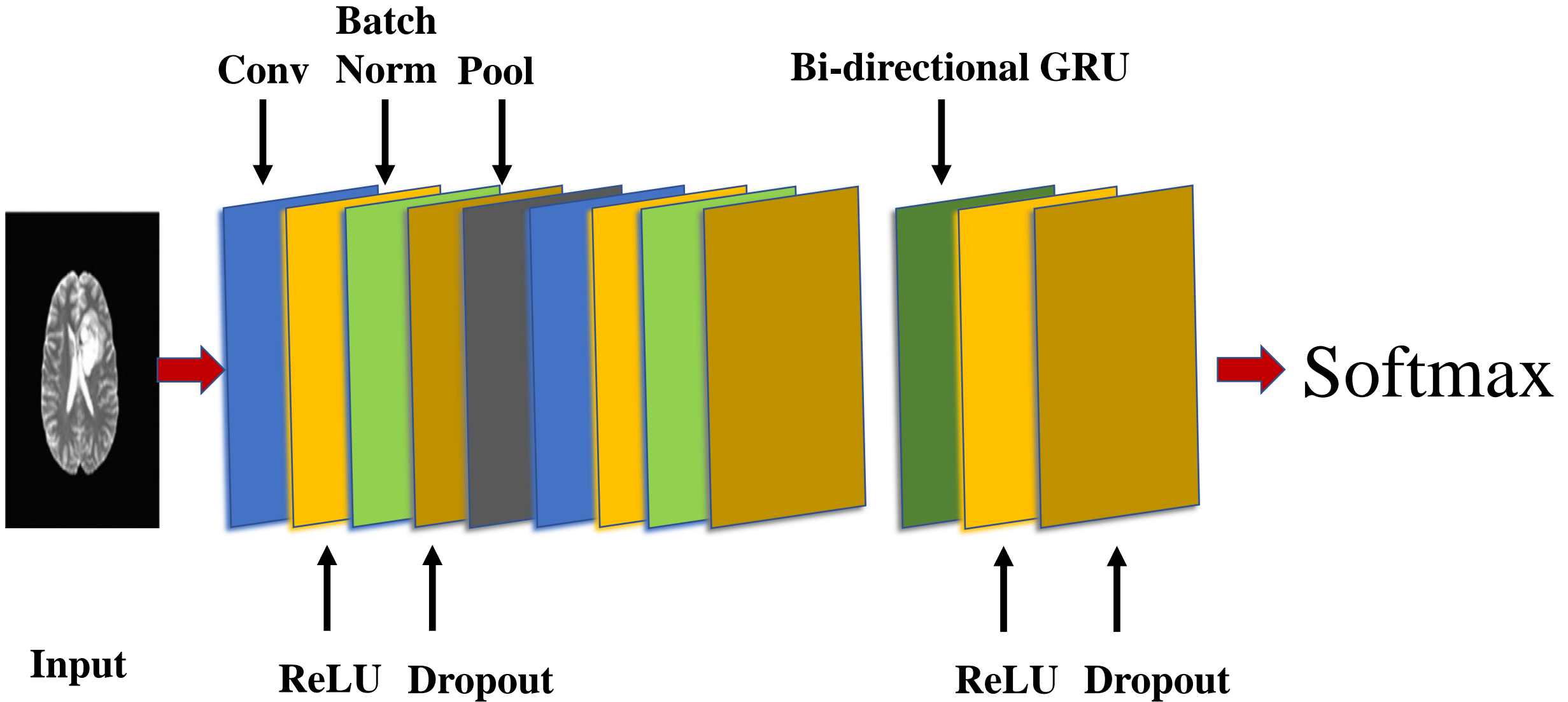
Technologies



Technologies

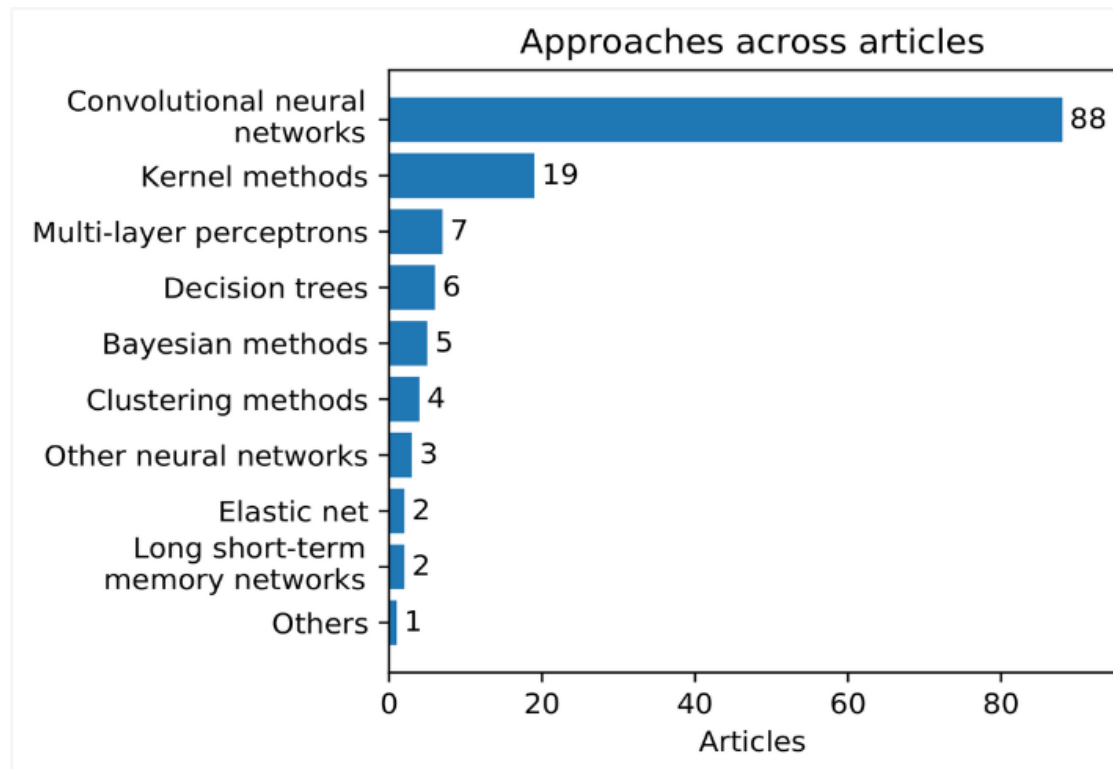


Technologies



Literature review

Deep learning with transfer learning

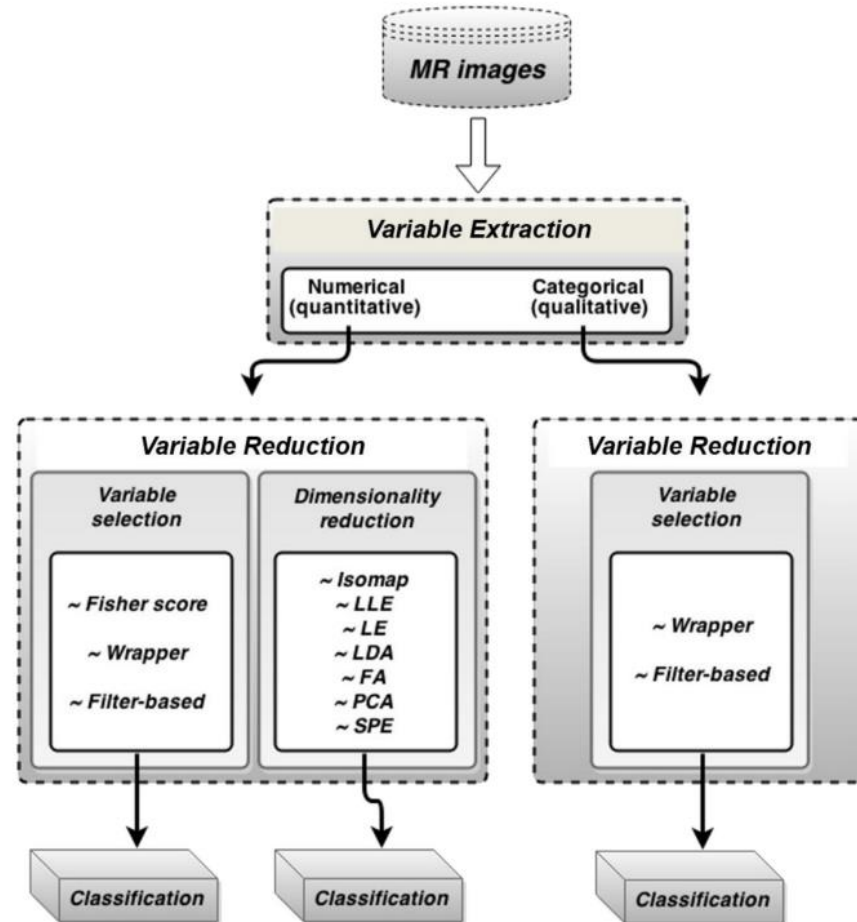


TL stores knowledge while solving one problem and applies it to another related field([Day and Khoshgoftaar, 2017](#)).

Reports show that **Deep learning with transferred high-level features** can make precise diagnosis possible and medical resource be full use of ([Valverde et al., 2021](#)).

Literature review

Variable selection for traditional machine learning method



This prediction problem can be easily solved by traditional machine learning method.

Variable selection and **dimensionality reduction** both need to be used for the high dimension dataset contained in the MRI scan to reduce variable.

(Vasileios G.Kanas et al., 2016)

Thank you