

# Survival Prediction of Glioblastoma Patients using Modern Deep Learning and Machine Learning Techniques

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Glioblastoma and it's survival

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Interpretable Auxiliary Tool

# 01. Introduction



Glioblastoma

Median Survival of 9 to 16 Months

Machine Learning and Deep Learning

Interpretable Decision-Making System

# 02.

## Data Collection and Preparation

Surveillance, Epidemiology,  
and End Results (SEER)  
Database

Pre-processing

Balancing: SMOTE, SMOGN

Feature Importance

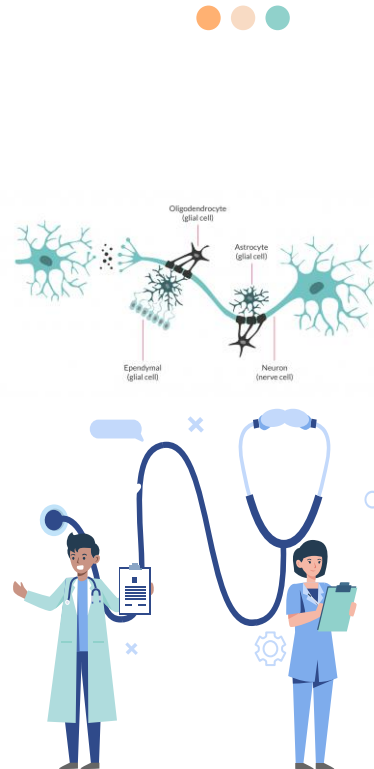
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Classification Samples:

46,340, 5 Classes

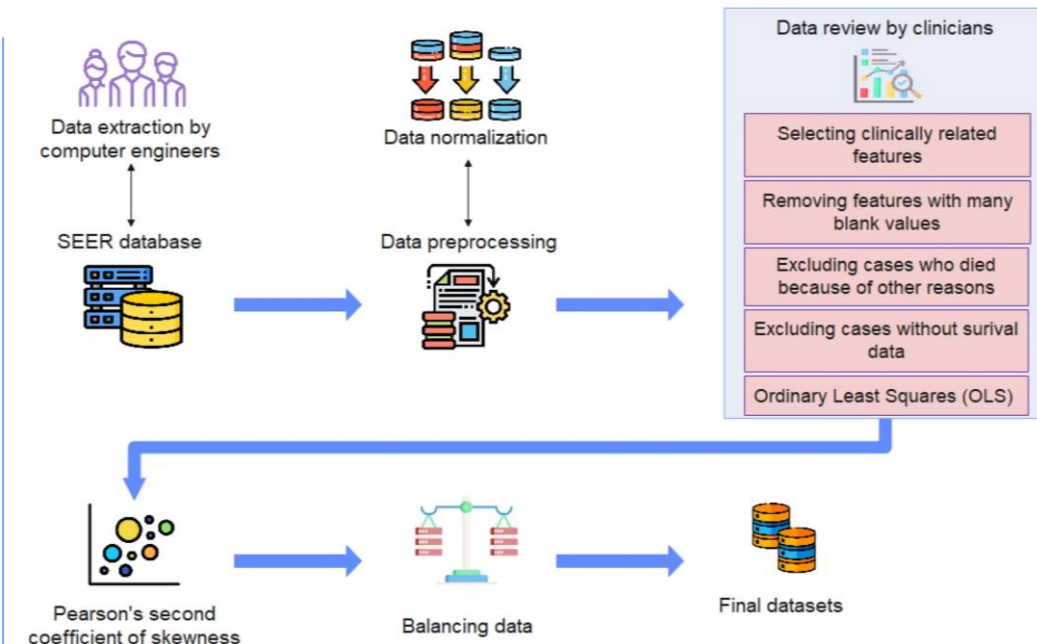
Regression Samples:

28,573



# 02.

## Data Collection and Preparation





## 03. Developing Predictive Models

### Deep Learning and Machine Learning Algorithms

- Extreme Gradient Boosting (XGBoost)
- Adaptive Boosting (AdaBoost)
- Decision Tree (DT),
- K-Nearest Neighbors (KNN)
- Random Forest (RF)
- Deep Neural Network (DNN)

## 04. Protocols of AI in Medicine



Transparency



Control



Verification

# 05. Interpretable AI

## SHAP

Shapley Additive Explanations

## Tree Based Models

Extracting Decision Trees



# Results of DNN Model

## Classification Approach

Five Fold Cross Validation:  
Accuracy 90.22%

Hold-Out (Train: 80%, Test: 20%):  
Accuracy 90.25%

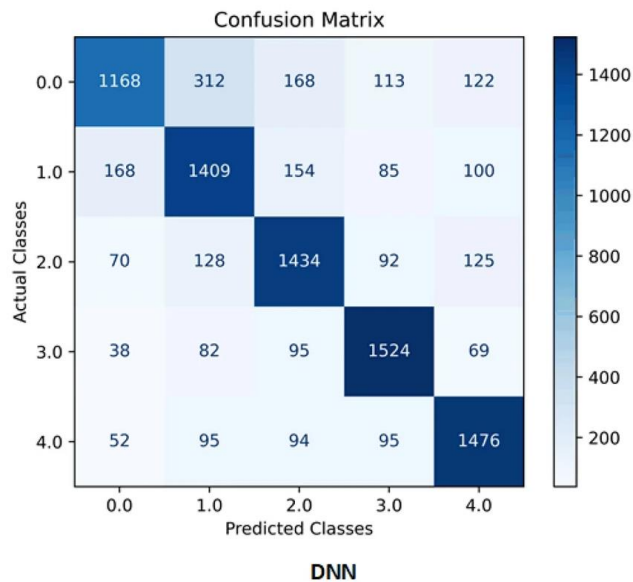
## Regression Approach

Five Fold Cross Validation:  
R-squared 0.6622

Hold-Out (Train: 80%, Test: 20%):  
R-squared 0.6565

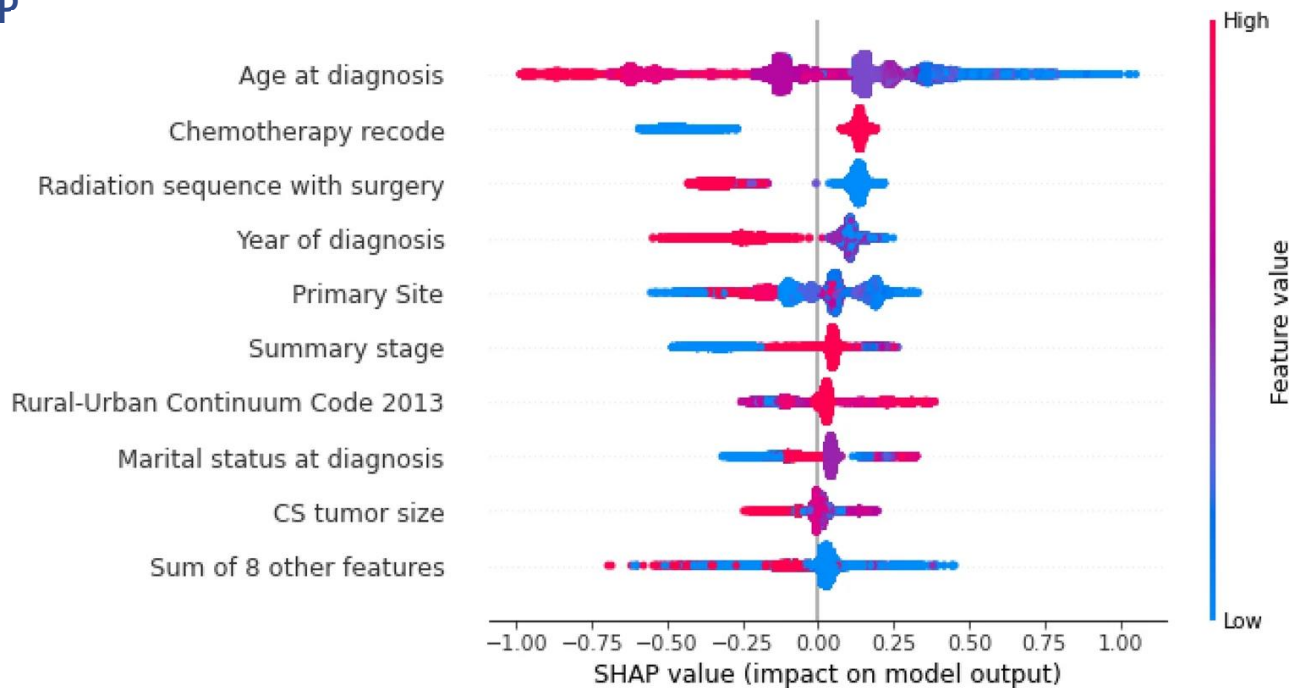
# Results of DNN Model

## Confusion Matrix



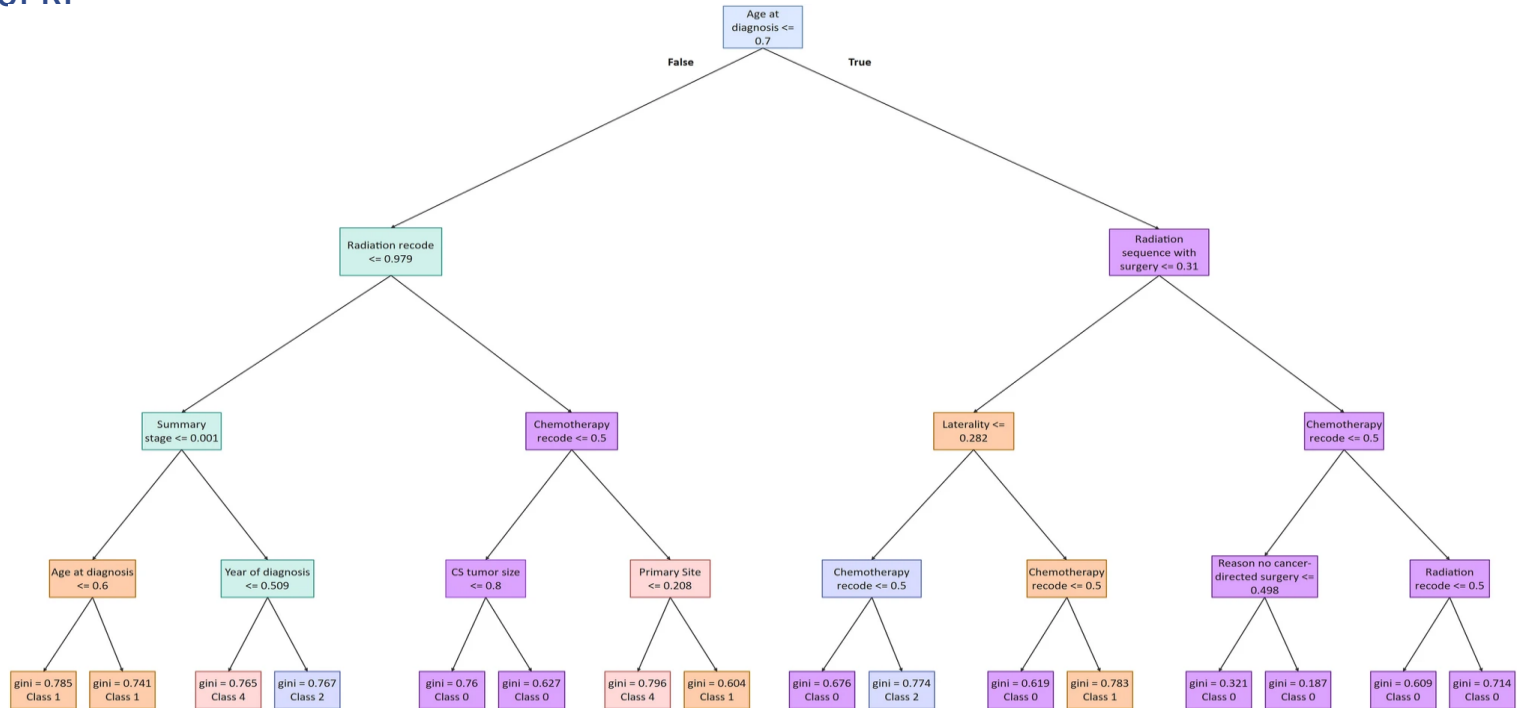
# Results of DNN Model

## SHAP



# Results

12<sup>th</sup> DT of RF



## 06. Limitations

A blue rectangular box with rounded corners and a thin blue border. In the top right corner, there are three small white circles. Inside the box, the text "Absence of Comprehensive Treatment Details" is centered in a dark gray font.

Absence of Comprehensive  
Treatment Details

**Diabetes**

A teal rectangular box with rounded corners and a thin teal border. In the top right corner, there are three small white circles. Inside the box, the text "Lack of External Validation" is centered in a dark gray font.

Lack of External  
Validation

**Dataset**



## 07. Conclusion

DNN Outstanding Performance

Devising Tailored Treatment Plans

Alleviating Challenges and Anxieties

Interpretable    Auxiliary    Tool    for  
Clinicians

Do you have any questions?

THANKS!

