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**Final Project**



3/21/2024 **Annual Review**

## **Bone Tumor Classification and Prediction Using Artificial Neural Networks**



3/21/2024 **Annual Review**

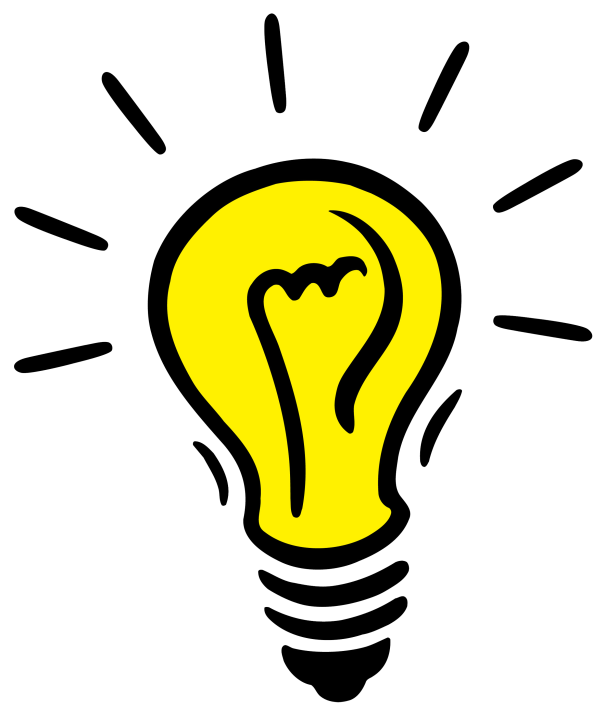
# AGENDA

* PROBLEM STATEMENT
* PROJECT OVERVIEW
* WHO ARE THE END USERS?
* YOUR SOLUTION AND ITS VALUE PROPOSITION
* THE WOW IN YOUR SOLUTION
* MODELLING
* RESULTS

PROBLEM STATEMENT

Develop a predictive model using Artificial Neural Networks (ANNs) to classify and predict bone tumors based on medical imaging data such as X-rays, MRIs, or CT scans. The model aims to accurately distinguish between benign and malignant bone tumors, providing healthcare professionals with a valuable tool for early detection and diagnosis.

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PROJECT OVERVIEW

Create a develop an ANN-based predictive model for classifying bone tumors as benign or malignant using medical imaging data such as X-rays, MRIs, or CT scans. Artificial Neural Networks (ANNs) offer a promising approach for improving the accuracy and efficiency of bone tumor prediction based on medical imaging data.

Overview:

* Introduction
* Objective
* Data collection and preprocessing
* Exploratory data analysis(EDA)
* Model development
* Model training and evaluation
* Hyperparameter tuning and optimisation
* Model deployment and integration
* conclusion

**WHO ARE THE END USERS?**

* **Radiologists and Oncologists**
* **Orthopedic Surgeons**
* **Healthcare administrators**
* **Patients**
* **Primary care physicians**
* **Medical researchers**

**YOUR SOLUTION AND ITS VALUE PROPOSITION**



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1. The accuracy aids healthcare professionals in making informed decisions regarding patient diagnosis and treatment planning.
2. Early diagnosis can lead to better patient outcomes by facilitating timely access to appropriate medical care and treatment modalities.
3. Healthcare professionals can make faster and more accurate diagnostic decisions, resulting in reduced turnaround times and optimized patient care.
4. Accurate prediction of bone tumor classifications facilitates the development of personalized treatment plans tailored to individual patient needs.
5. Patients can better understand their diagnosis, prognosis, and treatment options, leading to increased engagement and participation in their care.
6. It gives better patient outcomes, increased patient satisfaction, and enhanced reputation for healthcare providers.



THE WOW IN YOUR SOLUTION

* **High Accuracy and Precision:** Its ability to correctly classify tumors with a high degree of accuracy is impressive and instills confidence in healthcare professionals and patients alike.
* **Early Detection Capability:** Early detection is crucial for improving patient outcomes and survival rates, making the model's capability to identify tumors in their nascent stages a significant wow factor.
* **Streamlined Diagnostic Process:** Healthcare professionals can make faster and more accurate diagnostic decisions, resulting in reduced wait times and expedited treatment initiation.
* **Cost and Resource Savings:** This not only reduces healthcare expenditures but also optimizes resource allocation and enhances the overall efficiency of healthcare delivery.
* **Empowerment of Healthcare Professionals:** This empowerment enhances clinical decision-making, fosters collaboration among healthcare teams, and ultimately improves patient outcomes.
* **Enhanced Patient Engagement:** Patients are empowered by the solution through increased engagement in their healthcare journey.
* **Contribution to Medical Research: It**contributes to the advancement of medical research in the field of oncology by generating valuable insights into bone tumor characteristics, patterns, and treatment responses.

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# MODELLING

Certainly! Here are the steps involved in modeling for bone tumor predictions using Artificial Neural Networks (ANN):

1. Data collection.
2. Data preprocessing.
3. Data splitting.
4. Model architecture design.
5. Model compilation.
6. Model training.
7. Model evaluation.
8. Hyperparameter tuning and optimization.
9. Final model evaluation.

RESULTS

* ****Accuracy:**** The proportion of correctly classified tumor instances out of the total instances.
* ****Precision:**** The proportion of true positive predictions among all positive predictions made by the model.
* Recall (Sensitivity): The proportion of true positive predictions among all actual positive instances in the dataset.
* ****F1-score:**** The harmonic mean of precision and recall, providing a balanced measure of the model's performance.
* Confusion Matrix: This matrix provides insights into the model's performance for each tumor class.
* Compare the performance of the ANN model with baseline models or alternative machine learning algorithms to assess its effectiveness in bone tumor prediction.