

## Technical Presentation

Hello everyone,

Today, I'm excited to share insights from my recent project focused on improving breast tumor classification. Let's dive right in!

### **Overview**

I'll discuss how data science was used to enhance the accuracy of identifying whether breast tumors are malignant or benign. This project is crucial as it directly impacts medical decision-making and patient care.

### **Business and Data Understanding**

#### Objective

The primary goal of this project is to develop a machine learning model that assists medical professionals and researchers in accurately diagnosing breast cancer based on the characteristics of breast masses.

#### Business Problem

The problem at hand is to predict whether a breast mass is malignant or benign with very high accuracy. Early and accurate detection ensures that patients receive the best medical care and treatment for breast cancer.

#### Success Criteria

The success of this project will be measured by the model's performance metrics, including accuracy, precision, recall, and the F1 score. These metrics must demonstrate high values to prove efficiency in diagnosis.

### **Data Understanding**

#### Dataset

I used the Breast Cancer Wisconsin (Diagnostic) Dataset from the UCI Machine Learning Repository.

#### Features

The features selected in the dataset, such as radius mean, perimeter mean, and area mean, provide insights into tumor size, with larger tumors potentially indicating malignancy. Texture-related features like texture mean and smoothness mean capture irregularities in tissue

patterns, while concavity and concave points features highlight irregular shapes often associated with malignant tumors. These features were obtained from medical imaging tests, clinical examinations, and patient histories, including procedures like needle biopsy, which provides minimally invasive tissue samples for analysis.

### **Modeling**

I developed three main models: Logistic Regression, Support Vector Machine (SVM), and Random Forest. These models help classify breast tumors by analyzing the selected features.

### **Evaluation**

I evaluated the models using metrics such as accuracy, precision, recall, and ROC-AUC. These metrics tell us how well each model predicts whether a tumor is malignant or benign.

### **Recommendations**

Based on my findings, I recommend using the Logistic Regression model due to its reliability and effectiveness in tumor classification. It showed a testing accuracy of 97%, precision of 95%, recall of 97%, and an F1 score of 96%. These high values indicate the model's ability to correctly identify tumors, which is crucial for early and accurate cancer detection.

### **Next Steps**

Moving forward, I propose cross-validating predictions with multiple models to enhance confidence in diagnoses. Additionally, I suggest considering input variables like genetic markers to further improve model performance. Maintaining model interpretability and transparency is also crucial for effective collaboration between data scientists and medical professionals.

Thank you