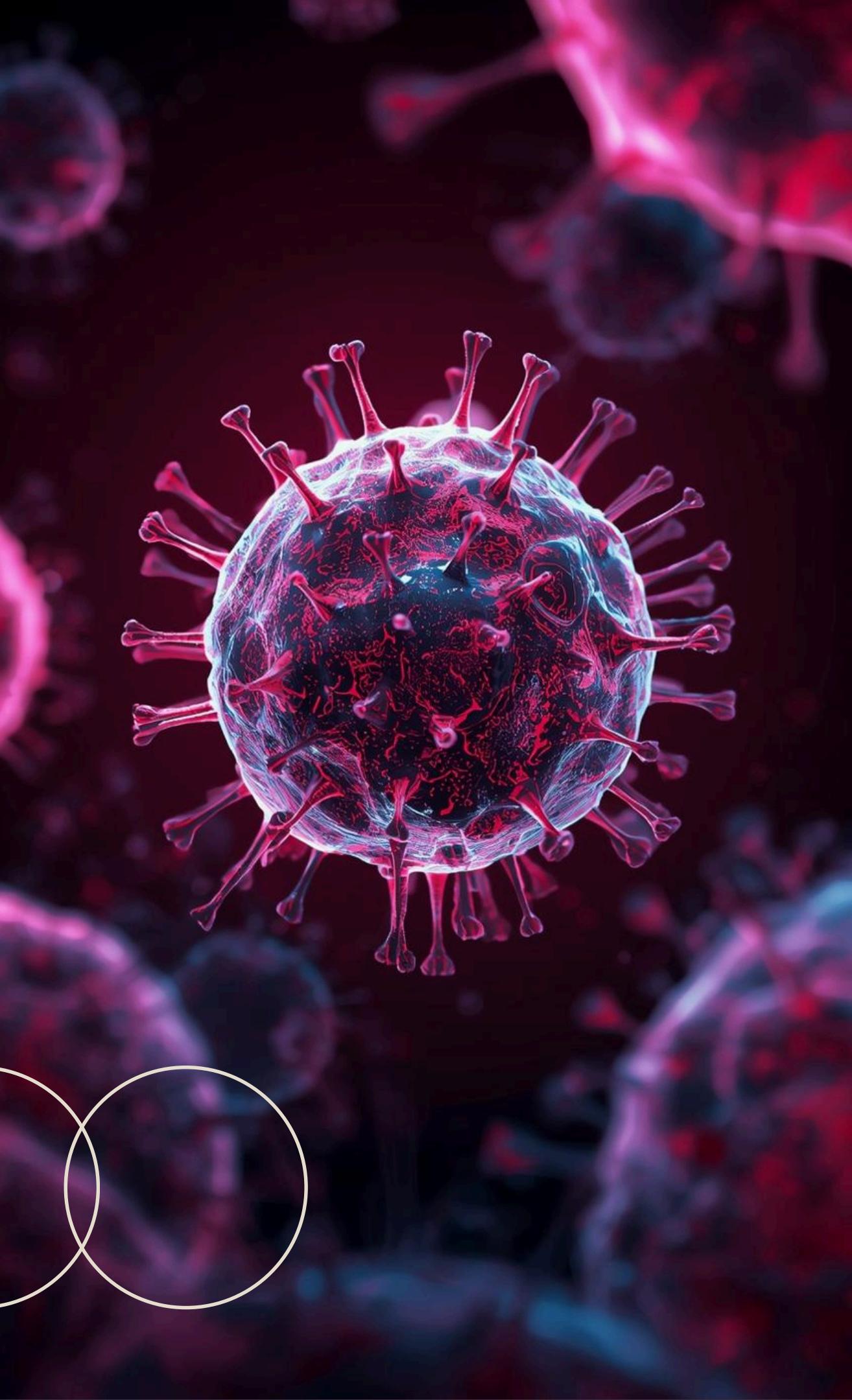
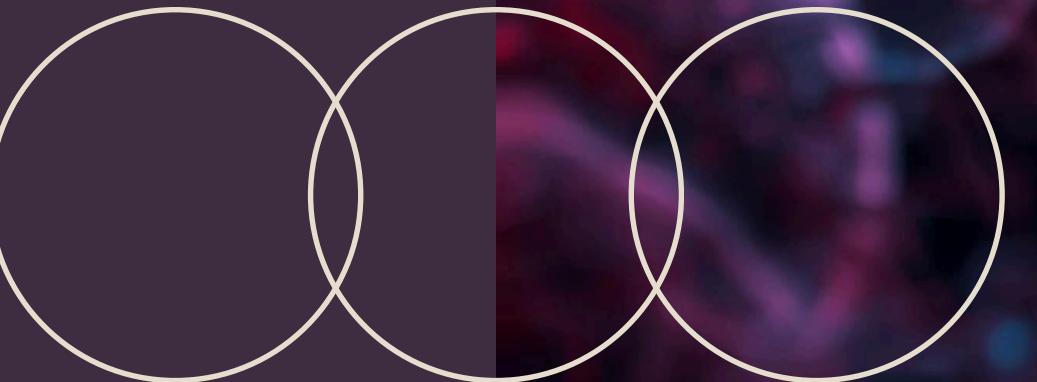


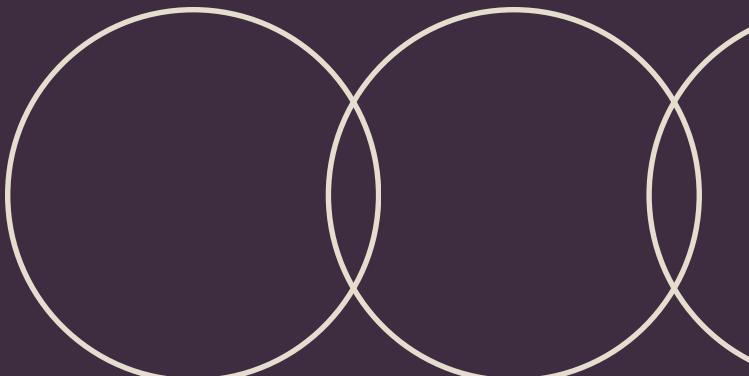
FIGHTING BREAST CANCER WITH DATA

Date: 05/11/2025



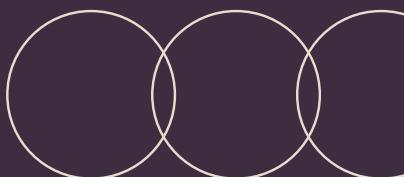
BUSINESS UNDERSTANDING

- Breast Cancer remains one of the leading causes of cancer related deaths among women worldwide.
- Early detection and accurate prediction of patient outcome are essential in improving survival rate and guiding treatment decisions.



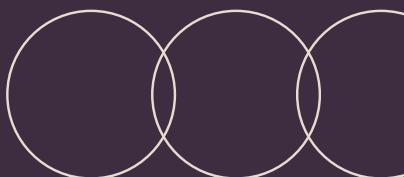
PROBLEM STATEMENT

- Doctors often face challenges in diagnosing breast cancer early and accurately because manual image analysis is slow and prone to human error.
- There is a need for a data-driven tool that integrates image and clinical information to improve diagnostic accuracy and support personalized treatment decisions.



PROJECT OBJECTIVE

- Develop a CNN model that classify breast cancer images as benign or malignant.
- Analyze clinical data to identify key factors affecting patient survival and treatment outcomes.
- Build a predictive machine learning models for survival and treatment effectiveness.
- Demostrate how integrated image-based & clinical models improve diagnosis and prognosis.



DATA UNDERSTANDING

This project uses 2 types of data:

- Tissue Images - Microscopic images of breast tissues.
- Patient Data - Clinical and genetic information from patient records.



METHODOLOGY

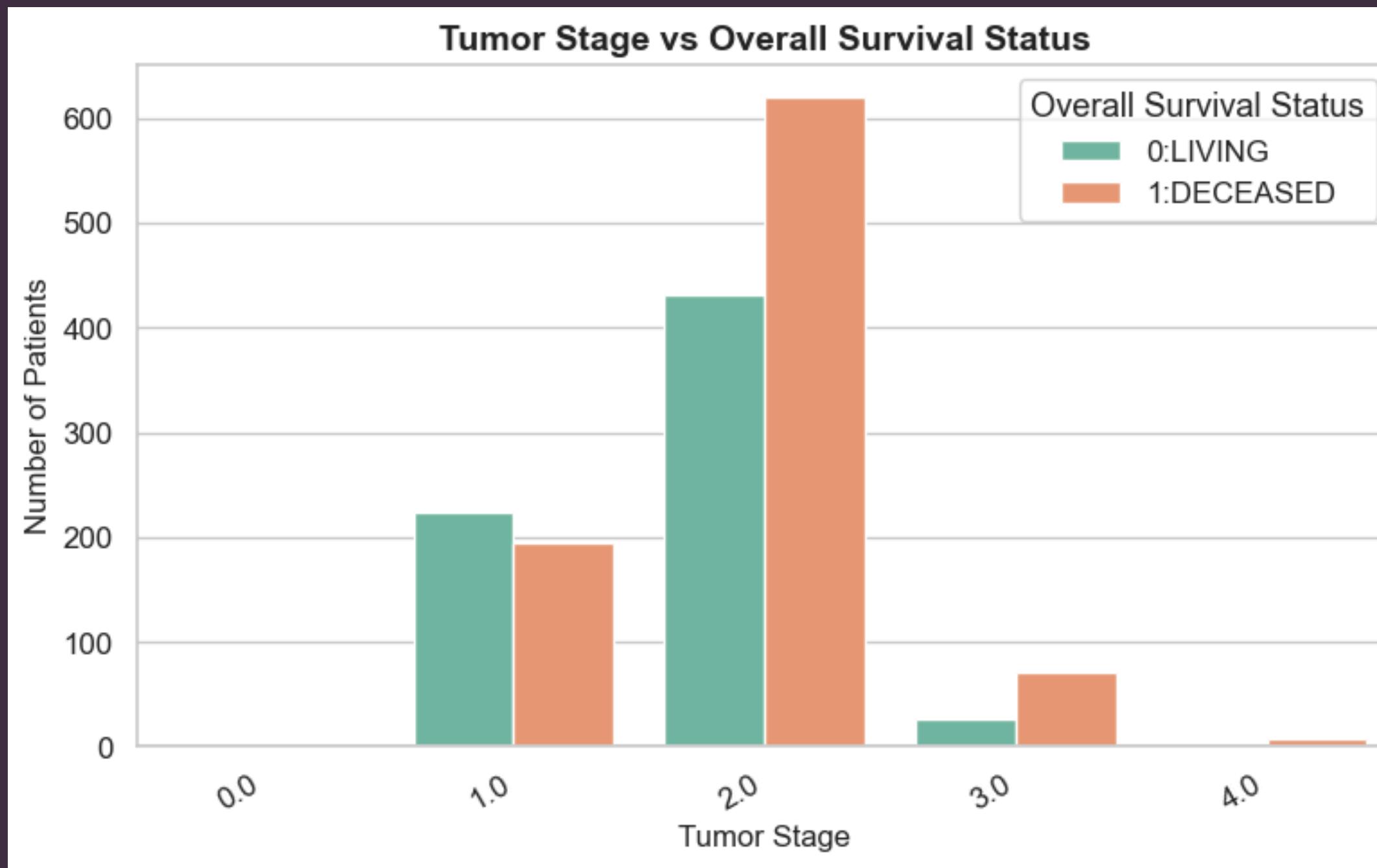
IMAGE-BASED ANALYSIS

- Image preprocessing
- CNN model design
- Model training and validation
- Performance evaluation using accuracy, precision, recall, and confusion matrix

CLINICAL DATA ANALYSIS

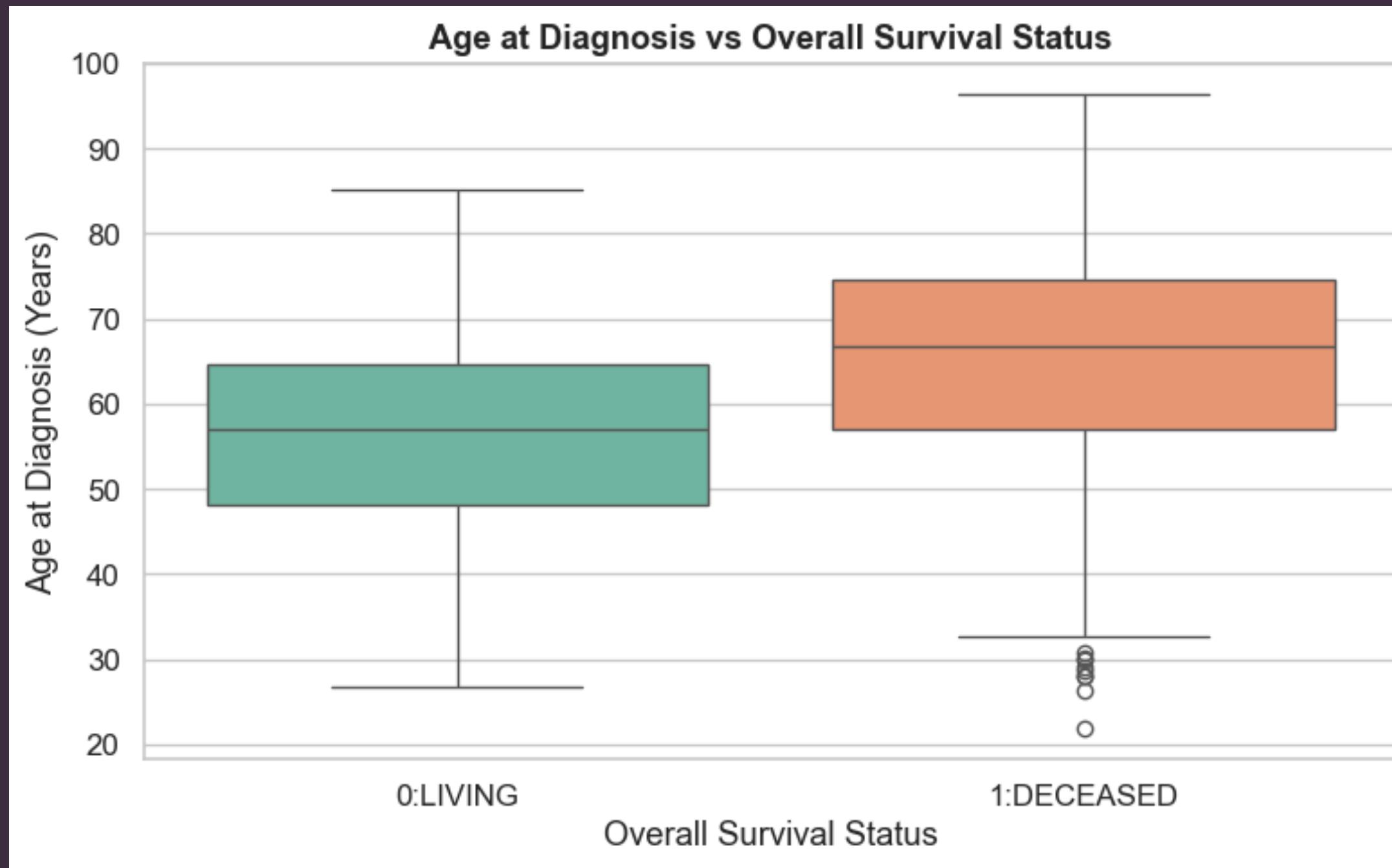
- Data cleaning (handling missing values, encoding categorical features)
- Merging
- EDA and visualization
- Modeling and feature importance
- Model Evaluation

EFFECT OF TUMOR STAGE ON SURVIVAL



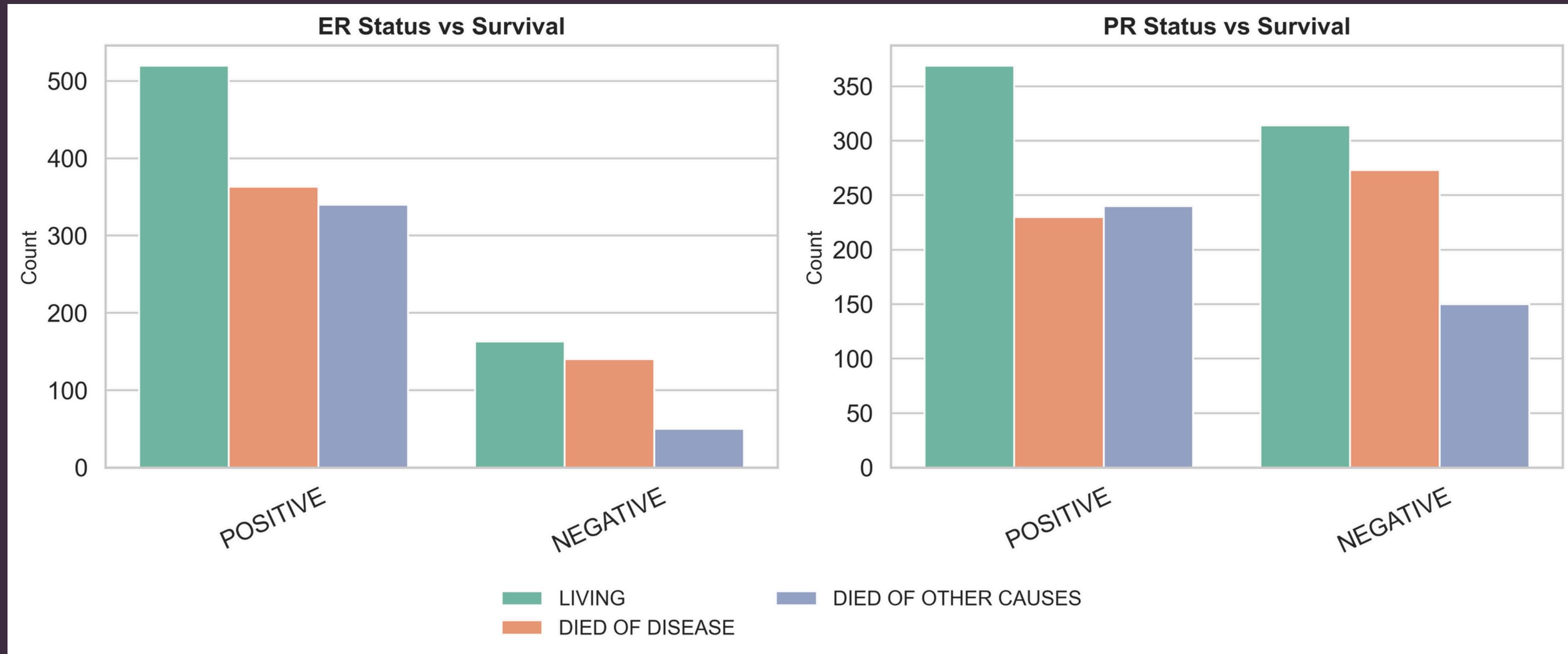
- Lower Tumor stages (0 and 1) have better survival rates compared to higher stages (2 and 3)- bar for deceased patients is higher than that of living patients in stages (2 ,3 & 4)

HOW AGE AFFECT SURVIVAL



- Most deceased patients were diagnosed at an older age (Above 68). The presence of outliers suggest that there are some younger patients (Below 38) who also experienced poor survival
- Most of middle age (45-65) patients are living indicating better survival outcomes for these groups

HOW ER/PR STATUS AFFECT SURVIVAL



- Patients with hormone receptor-positive tumors (ER+ and PR+) generally have better survival (bar for living with disease is highest) compared to patients with ER- & PR-

KEY INSIGHTS

1. Lower Tumor stages have better survival rates compared to higher stages
2. Older patients at diagnosis have poorer survival outcomes.
3. Patients with hormone receptor-positive tumors (ER+ and PR+) generally respond well to hormonal therapy and tend to have better survival.
4. Chemotherapy has a positive impact on survival
5. The CNN achieved approximately **80% test accuracy**, effectively distinguishing benign from malignant tissues.



CONCLUSION

1. Data and machine learning can work together to enhance breast cancer diagnosis and treatment.
2. The CNN model accurately detect malignant tumors, supporting earlier and more reliable diagnosis.
3. Tumor stage, age at diagnosis, type of treatment strongly influence survival outcomes
4. Combining image and clinical insights enables personalized, data-driven healthcare that can improve patients outcome

RECOMMENDATIONS

1. Adopt these data-driven tools in hospitals to help oncologists predict early detection and improve survival outcomes then recommend appropriate therapies
2. Clinicians can use the feature importance insight to identify key clinical factors & genes influencing survival.
3. Prioritize public awareness, screening programs & routine check-ups for women to promote early stage detection.
4. Combine CNN outputs with survival and treatment prediction models for multi-modal cancer analysis.

Thank you

NEURAL NEXUS

- Elsie Almadi
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