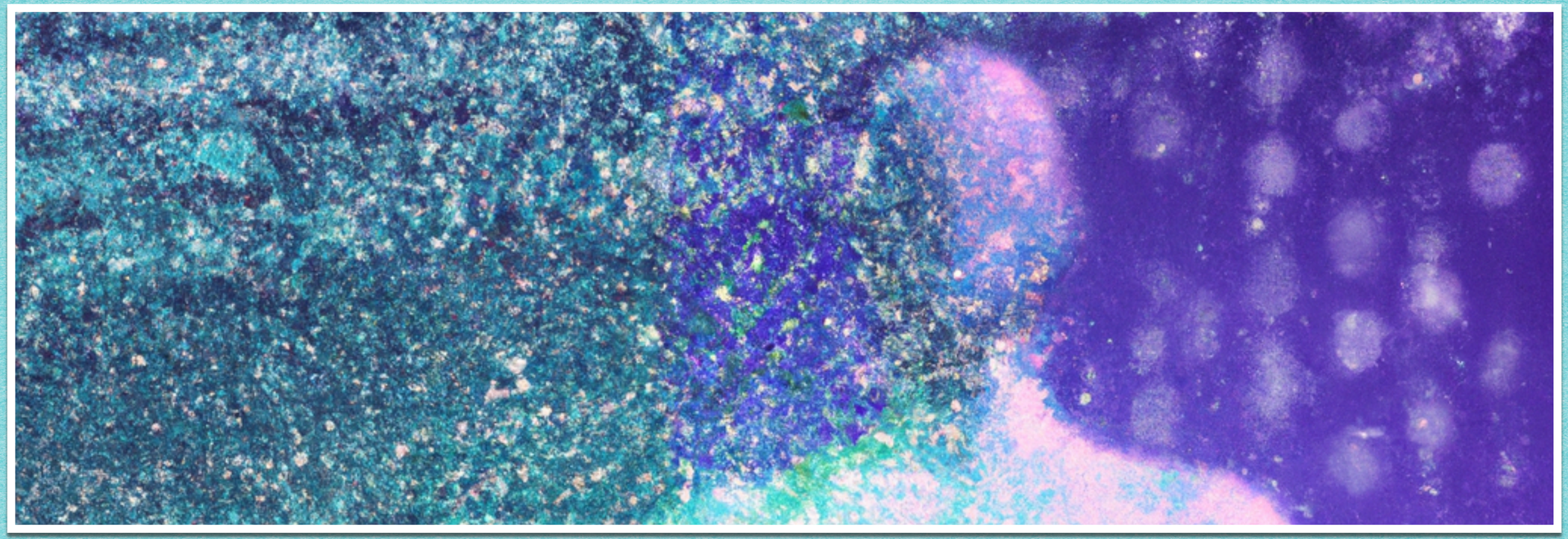

# *Breast Cancer Detection Using Deep Learning*

*Review 1*

# *Team Members*

*Chinmay Pagey 20MIA1112*
*Chandan Kumar Sangewar 20MIA1119*
*V Kamna Lodha 20MIA1053*
*Aman Kumar 20MIA1144*

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# Overview of Breast Cancer

- Cancer of the breast is a specific kind of the disease that affects the cells that make up breast tissue. It takes place when normally occurring cells in the breast tissue undergo a transformation and begin to grow uncontrollably, which results in the formation of a lump or mass. If the cancer is not treated, the cancer cells may spread to other regions of the body, which can have devastating effects on the patient's health.

# Limitations of Traditional Methods of Breast Cancer Detection

- Traditional diagnostics may **miss certain breast cancers**. Delayed diagnosis and treatment might damage patients.
- **False positives:** Traditional methods may find harmless suspicious locations. Patients may worry about unnecessary biopsies.
- **Inconsistent Results:** Traditional methods use the healthcare provider's expertise, equipment, and images. Even at the same institution, results may differ.
- Mammograms **may overlook** non-palpable tumours. Delays diagnosis and treatment.
- **Low-dose radiation:** Repeated mammograms may scare some women.
- Mammogram pain might **create anxiety and reluctance** to get regular checkups.
- Uninsured women **pay more for mammograms and biopsies.** This may delay care.
- Mammograms may **hide tumours in dense tissue.** This may delay therapy.

# Problem Statement

- Traditional breast cancer screening and diagnostic procedures lack accuracy, consistency, and accessibility, although early identification improves patient outcomes. Deep learning algorithms are promising for breast cancer screening. This study examines deep learning systems' breast cancer detection in mammograms. Deep learning algorithms will be compared to standard approaches to determine their influence on breast cancer diagnosis accuracy, efficiency, and accessibility. This study will illuminate deep learning's potential to enhance breast cancer detection and therapy.

# How can Deep Learning Solve These Problem

- **Improved accuracy:** Deep learning algorithms can examine enormous data sets and find patterns that human specialists may miss. This reduces false positives and negatives in breast cancer detection.
- **Radiation reduction:** Deep learning systems can evaluate breast pictures, eliminating the need for mammograms.
- **Consistent Outcomes:** Deep learning algorithms provide consistent results independent of the healthcare provider's competence. This may guarantee all women get the same care regardless of where they reside or receive treatment.
- **Early Detection:** Deep learning algorithms may identify tiny cancers that aren't palpable or apparent on mammograms, improving patient outcomes.
- **Efficiency:** Deep learning computers can interpret medical pictures quicker than humans, speeding up test results and ensuring women get timely and proper treatment.
- Deep learning algorithms can **automate medical picture processin**g, making breast cancer diagnosis cheaper for uninsured patients.

# Models That Can Be Applied To Detect Breast Cancer

- Convolution Neural Network(CNN)
- Recurrent Neural Network(RNN)
- Autoencoders
- Long-Short Term Memory(LSTM)
- Residual Networks(ResNet)

# Drawbacks of Using Deep Learning

- ***Deep learning can identify breast cancer, but it has drawbacks. Key problems and constraints:***
- **Lack of data variety:** Deep learning algorithms may be biassed and inaccurate due to a lack of data diversity in breast kinds and breast cancer instances.
- **Lack of Transparency:** Deep learning algorithms are "black box" systems, making their operations and logic difficult to understand. This may obscure how deep learning systems detect and raise bias problems.
- **Data quality:** Deep learning algorithm accuracy and performance depend on data quality. Mammograms with limited resolution or contrast may misdiagnose.
- **Problems:** Clinical applications of deep learning techniques need knowledge, computational resources, and infrastructure.
- **Regulation and Liability:** Medical uses of deep learning algorithms are extensively regulated, and inaccurate diagnosis may lead to liability.
- **Cost:** While deep learning algorithms may lower breast cancer diagnosis costs, designing and applying them may be expensive.

# About Dataset

- **Variables in Dataset**

1. Laterality
2. CC and MLO View
3. Implant
4. Density
5. Cancer
6. Biopsy
7. BIRADS
8. prediction_id
9. difficult_negative_case

# What Does Each Variable Mean

- **Laterality:** Whether the image is of the left or right breast
- **CC and MLO View:** While CC view depicts the entire breast, MLO view reflects more of the breast in the upper-outer quadrant, giving the best view of the lateral side of the breast, which statistically is the most common place for pathological changes.
- **Implant:** A breast implant is a prosthesis used to change the size, shape, and contour of a person's breast. In reconstructive plastic surgery, breast implants can be placed to restore a natural looking breast

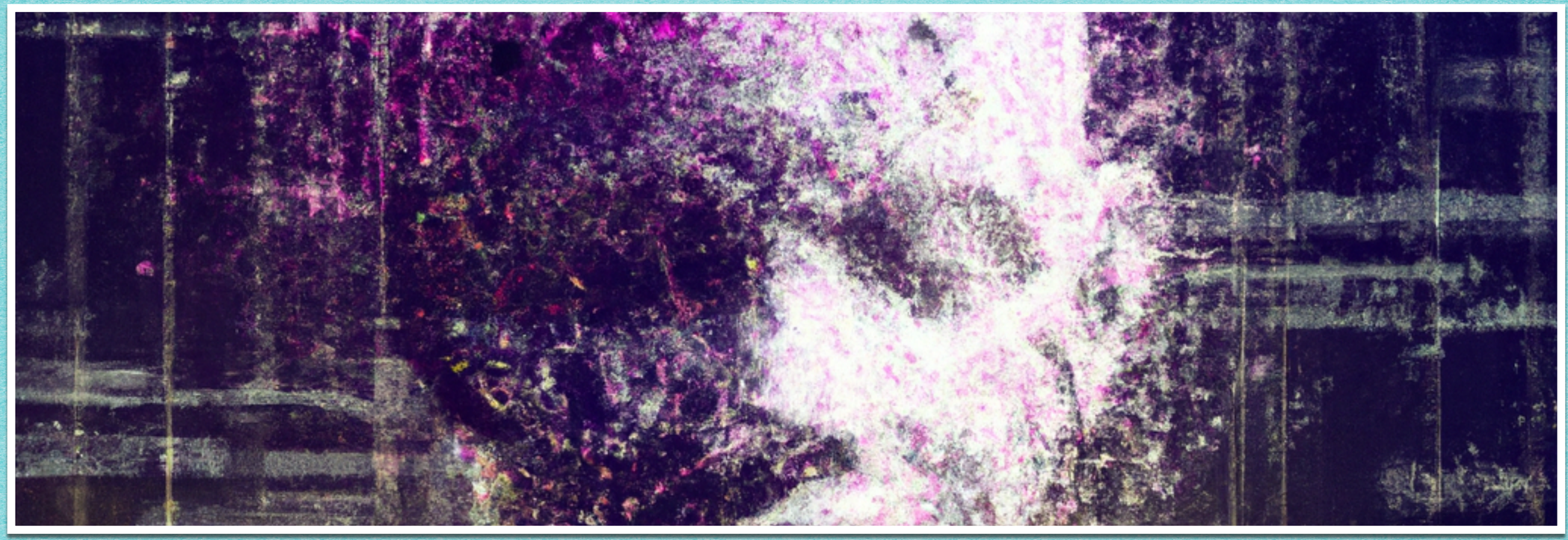
- **Density:** A rating for how dense the breast tissue is, with ‘A’ being the leas dense and ‘D’ being the most dense. Extremely dense tissue can make diagnosis more difficult. Only provided for training

- **Biopsy:** The removal of bodily tissues to diagnose an illness. Surgeons, interventional radiologists, and cardiologists do biopsies. Sample cells or tissues are extracted for illness detection. Cancer that has invaded nearby healthy tissues. Infiltrating cancer. Breast cancer starts in milk ducts or lobules. These places have invasive breast cancer. Invasive breast cancer may spread to lymph nodes after penetrating healthy tissue.

- **BIRADS:** 0 if the breast required follow-up, 1 if the breast was rated as negative for cancer, and 2 if the breast was rated as normal. A reporting system used to describe the results of a mammogram, breast ultrasound, or breast MRI in a standard way. BI-RADS ranks the test findings according to one of seven categories, ranging from normal or benign (not cancer) to highly suspicious or malignant (cancer). Each category includes follow-up recommendations to help manage a person's care.

- **prediction_id:** The ID for the matching submission row. Multiple images will share the same prediction ID. Test only

- **difficult_negative_case:** True if the case was unusually difficult. Only provided for train.



*Dataset and EDA of the Dataset on .ipynb file.*

*Thank You*