Breast Cancer Detection

GROUP NO. 3

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PROJECT GUIDE : DR. SATISHKUMAR CHAVAN

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Introduction

- What are breasts made of?
- What are the most common medical conditions?
- What is breast cancer and what are types of breast cancer?
- What are various screening techniques?
- The two views of a mammogram

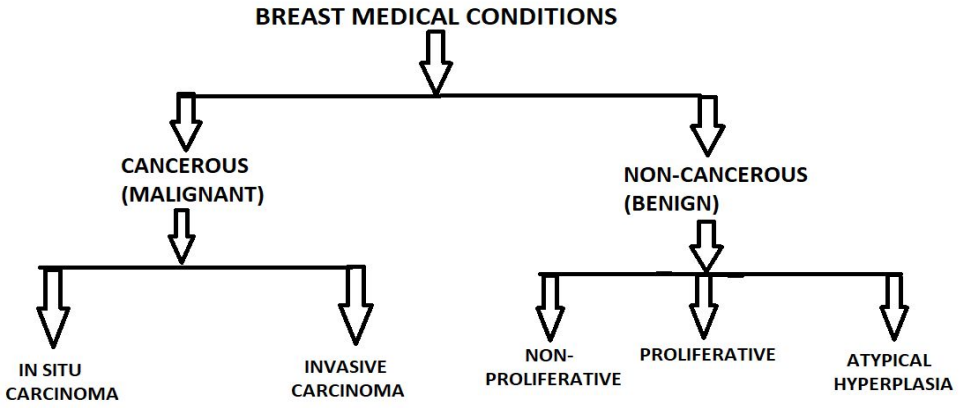


Figure 1

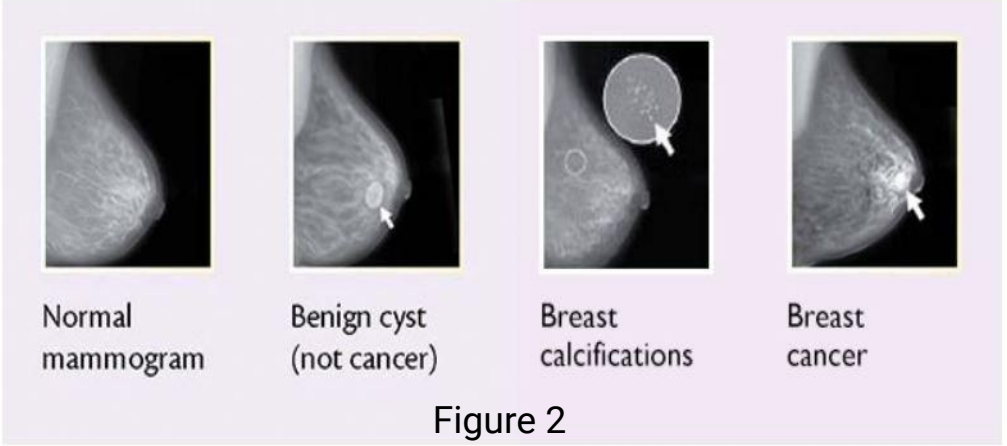
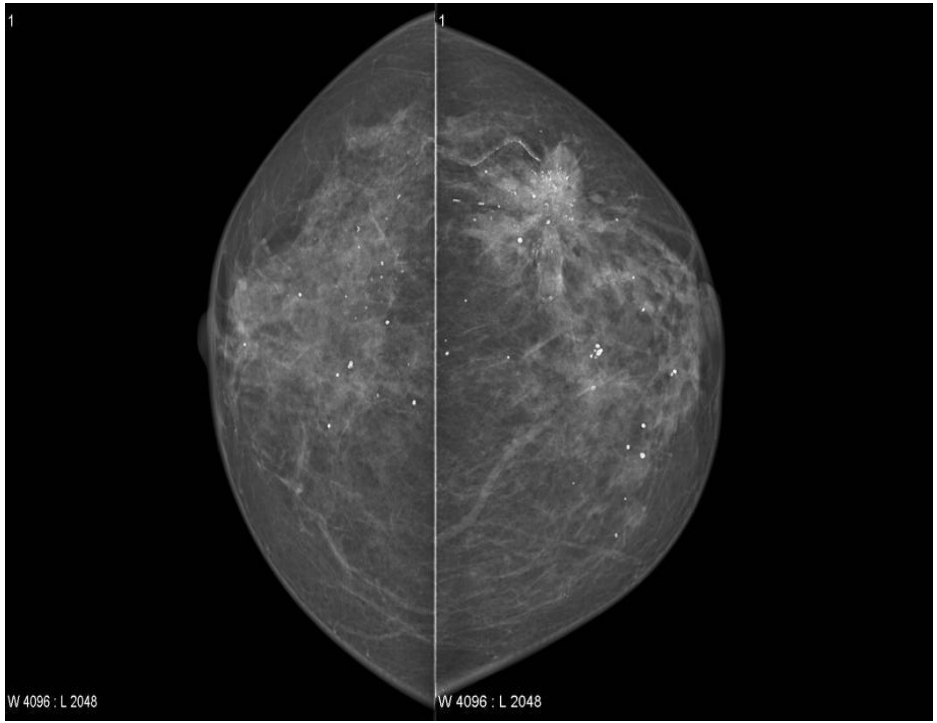


Figure 2

Introduction

MedioLateral-Oblique View



Cranial-Caudal View

Introduction - Statistics

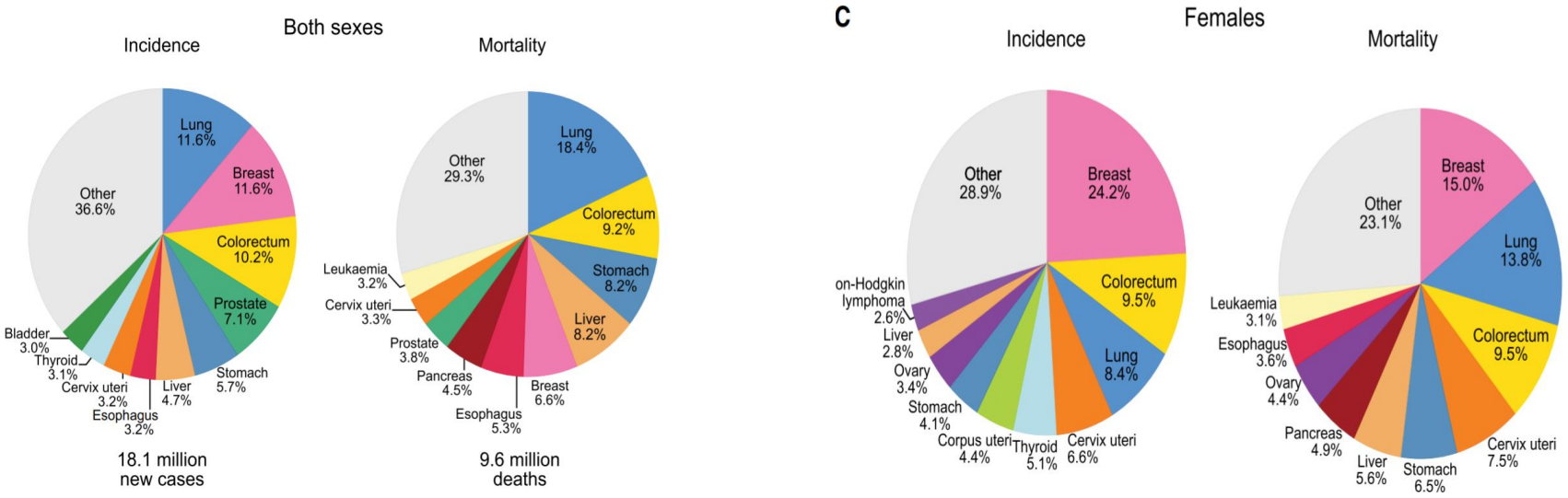


Figure 3

Motivation of Project

- Breast cancer has the second highest mortality rate in women next to lung cancer.
- There is need for a more robust, fast, accurate, and efficient non-invasive cancer detection system. an automated system is required for achieving error-free detection of breast cancer using mammogram.
- If the cancer is detected early, it increases expectancy of survival rate/mortality of patient.

Literature Survey

[1] Supervised and unsupervised methods of segmentation, such as k-nn and fuzzy c-means (FCM), in digital mammograms.

[2] AlexNet convolutional neural network(CNN) for Image classifications using graphics processing units (GPU) for training of the models.

[3] Deep learning algorithms to accurately detect breast cancer on screening mammograms using an end to end approach.

[4]Breast Cancer diagnosis using abnormalities on ipsilateral views of digital mammograms.

Literature Survey

[5]Breast Cancer detection using deep convolutional neural networks and support vector machines.

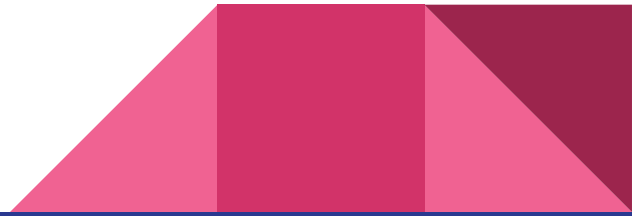
[6]Computer aided detection (CAD) of breast masses in mammography combined detection and ensemble classification.

[7]Automated breast cancer diagnosis using Deep learning and region of interest detection(BC-DROID)

[8]Unsupervised deep learning applied to breast density segmentation and mammographic risk scoring.

Problem Statement

To develop an automated detection and segmentation of tumours using mammogram in Cranial-Caudal and Medial-lateral oblique (CC and MLO) views using Deep Learning Techniques

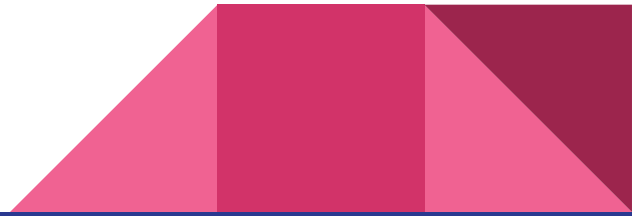


Objectives

- To classify the tumors as Benign and Malignant tumors.
- To detect location of the tumour.
- To automate the process of detection of abnormal tissues.
- To evaluate the performance of various Deep Learning approaches for detection and segmentation of tumours

Outcomes

- Software tool which automatically detects cancerous tissues.
- Software will be able to identify location of tumour and detect volume of tumour.
- It will act an an assisting tool to radiologists to classify or choose the abnormal mammogram and prioritise based on level of concern.
- Learning how to write a Technical paper using LaTeX



Type of Project

In our project we will be using the evolving techniques of Deep learning and Neural networks which are expected to accelerate and create even more innovative applications in the next few years.

Requirements

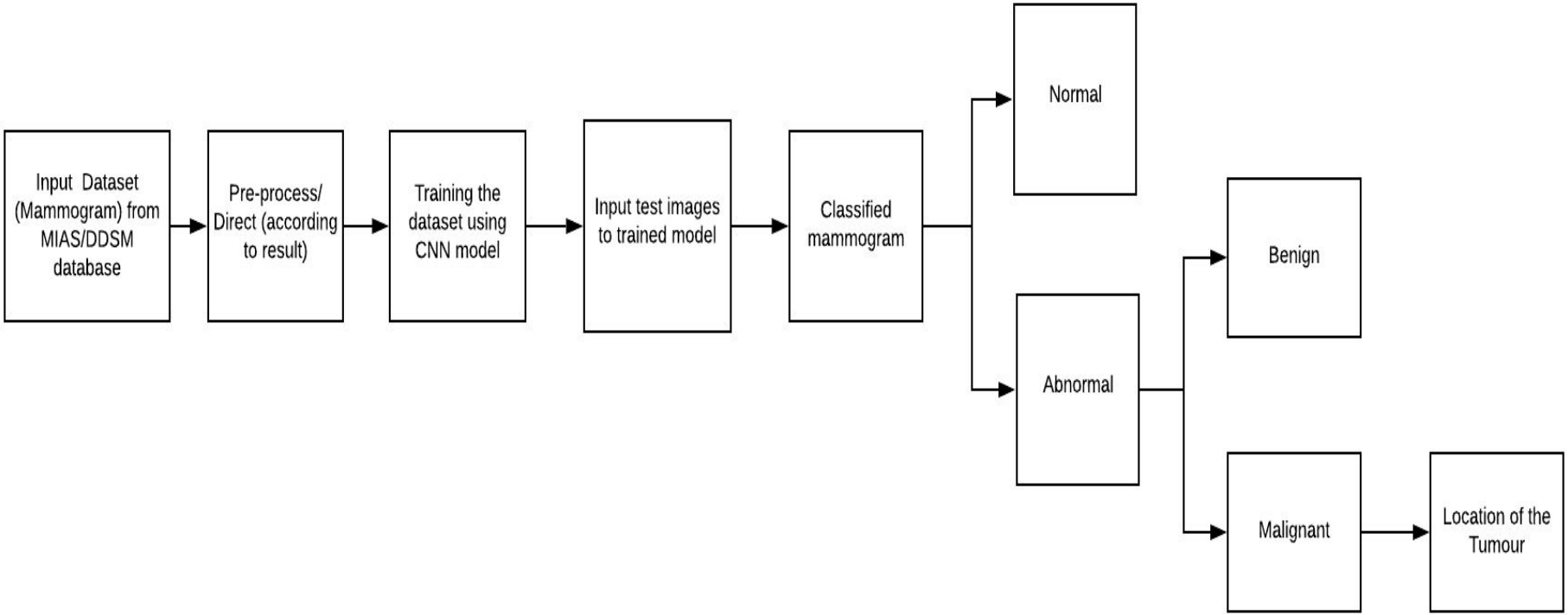
SOFTWARES

- Python 3/Open CV
- MATLAB R2016a
- Tensorflow & Keras/Pytorch/Pycharm

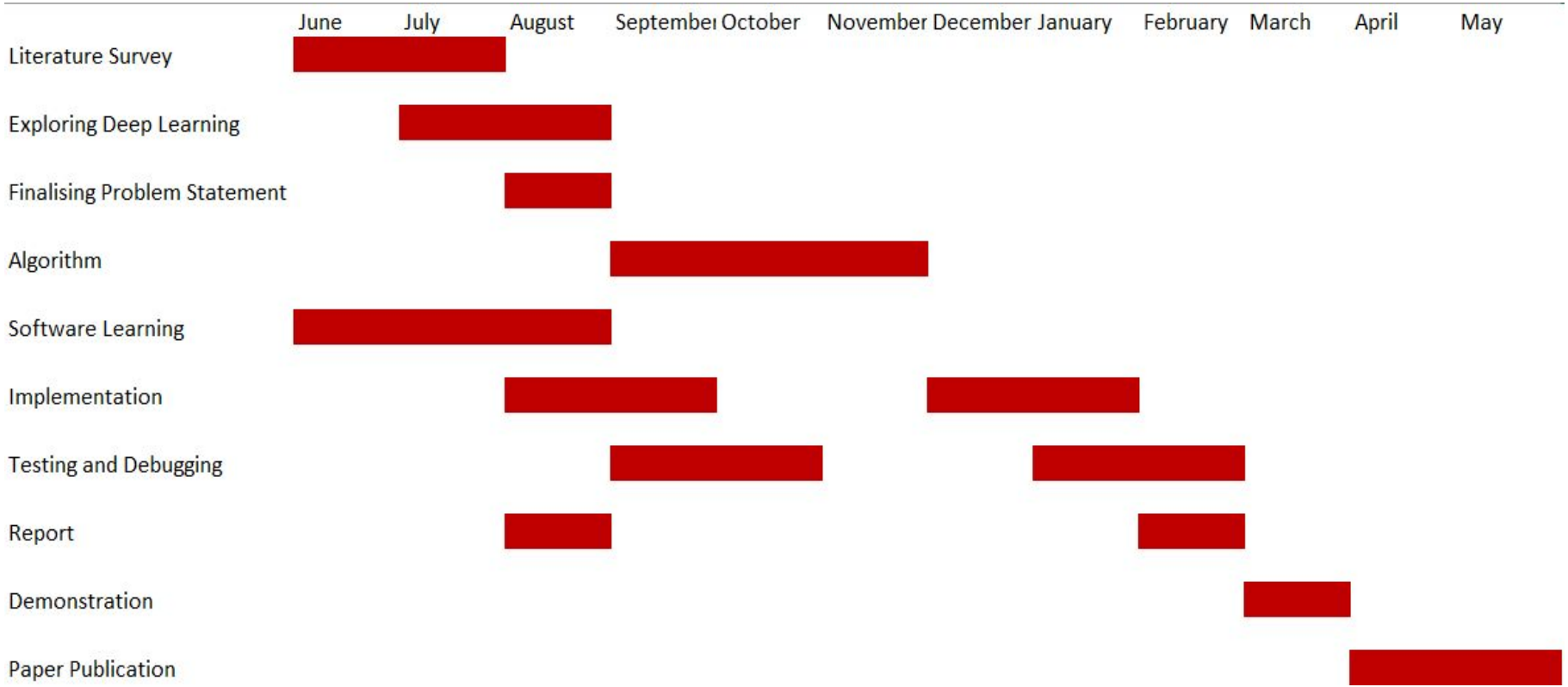
HARDWARE

- Specifications : Intel Core i7,8th Gen Processor,Windows 10, 16GB RAM, 512GB SSD,
- Google Collab

Block Diagram



Timeline of Execution of Project



References

[1] Cahoon, Tobias Christian, Melanie A. Sutton, and James C. Bezdek. "Breast cancer detection using image processing techniques." Ninth IEEE International Conference on Fuzzy Systems. FUZZ-IEEE 2000 (Cat. No. 00CH37063). Vol. 2. IEEE, 2000.

[2] Krizhevsky Alex, Sutskever, I., H. Geoffrey E.,“Alex Net,”. Adv. Neural Inf. Process. Syst,vol. 25, pp. 1-9,2012.

[3]Shen, Li, Laurie R. Margolies, Joseph H. Rothstein, Eugene Fluder, Russell McBride, and Weiva Sieh. "Deep learning to improve breast cancer detection on screening mammography." Scientific reports ,vol.9 no.1, pp. 1-12, 2019.

[4]Sapate, S., Talbar, S., Mahajan, A., Sable, N., Desai, S. and Thakur, M. Breast cancer diagnosis using abnormalities on ipsilateral views of digital mammograms. Biocybernetics and Biomedical Engineering, vol.40, no.1, pp.290-305., 2020.

References

[5]Ragab, D.A., Sharkas, M., Marshall, S. and Ren, J. Breast cancer detection using deep convolutional neural networks and support vector machines. PeerJ, vol.7, pp.6201.2019

[6]Choi, J.Y., Kim, D.H., Plataniotis, K.N. and Ro, Y.M. Computer-aided detection (CAD) of breast masses in mammography: combined detection and ensemble classification. Physics in Medicine & Biology, vol.59, no.14, pp.3697,2014.

[7]Ragab, D.A., Sharkas, M., Marshall, S. and Ren, J., Breast cancer detection using deep convolutional neural networks and support vector machines. PeerJ,vol. 7, pp.6201, 2019.

[8]Kallenberg, M., Petersen, K., Nielsen, M., Ng, A.Y., Diao, P., Igel, C., Vachon, C.M., Holland, K., Winkel, R.R., Karssemeijer, N. and Lillholm, M. Unsupervised deep learning applied to breast density segmentation and mammographic risk scoring. IEEE transactions on medical imaging,vol. 35, no.5, pp.1322-1331, 2016.

References

[9]Gozdzialski, Scott, Alex Stern, Ireti Fasere, and Daniel W. Engels. "The Simultaneous Detection and Classification of Mass and Calcification Leading to Breast Cancer in Mammograms." SMU Data Science Review vol.2, no.1, pp.10., 2019.

[10]Shi, Ge, Tim Kong, Wynn Tran, Lisa Wang, and Paris-Ann Ingledew, "44 Learning Oncology Online: Patterns of Use of an Expanding Online Resource for Medical Students," Radiotherapy and Oncology, vol.139, pp. 21-22, 2019.