UE20CS390B – Capstone Project Phase – 2

Project Progress Review # 1

Project Title : Pixel level balancing with ML models to detect breast cancer and to identify its stage.
Project ID : PW23_SN_02
Project Guide : Dr. S Natarajan
Project Team with SRN : 133_253_437_574

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Abstract and Scope

- Breast cancer is a malignant disease that affects a large number of women worldwide.
- The scope of our project involves the development of a model that can accurately detect breast cancer in patients using various types of data, such as mammography images, demographic information, and medical history, tissue samples etc.
- Our project will also detect the stage of cancer once it has been detected in the patient.

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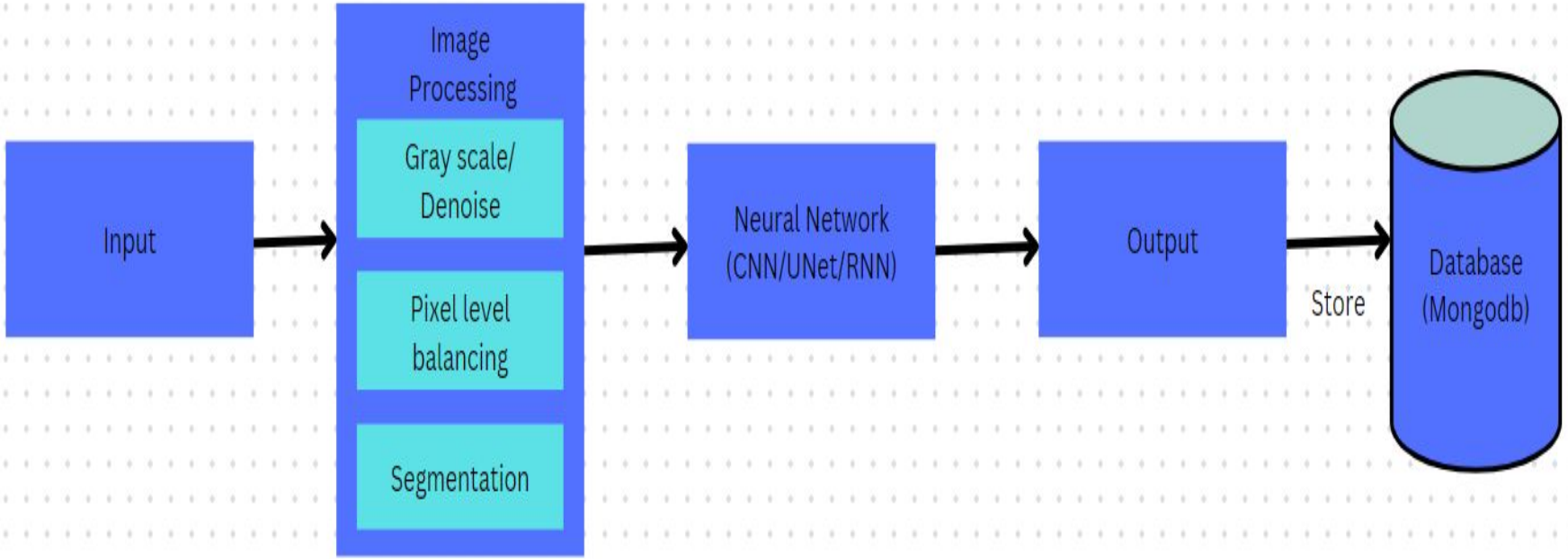
Summary of Work Done in Capstone Project Phase - 1

1. We precisely defined the project's problem statement and its specific goals.
2. Conducted a thorough literature survey to comprehend existing methodologies and identify potential gaps.
3. Carefully determined the most suitable dataset type to address the research objectives.
4. Established connections with relevant sources based on suggestions from our mentor and the panel and successfully procured the required dataset.
5. Applied diligent preprocessing techniques and applying Pixel Level to enhance dataset quality and consistency.
6. Finalized the model architecture by considering project requirements and design principles.
7. Implemented and evaluated various models, aligning with the chosen architecture, to lay the foundation for subsequent phases.

Architecture



List of Tasks/Modules

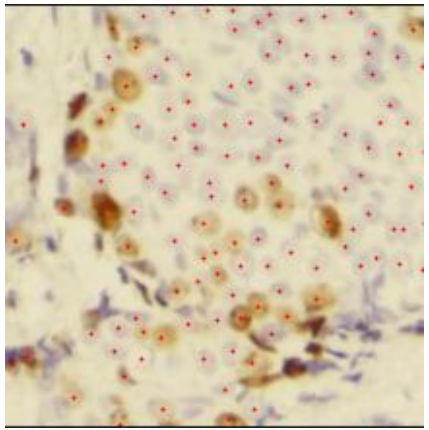
1)Dataset Creation:

- Plotting annotations on the given images.
- Dividing each image into 25 regions.
- Regions here indicate the portion surrounding the annotations which represent cancerous/non-cancerous parts of the image.
- Separating them into both classes by segregating the divided images to obtain the Cancerous/Non Cancerous classes.

List of Tasks/Modules

1)Dataset Creation:

Before division-

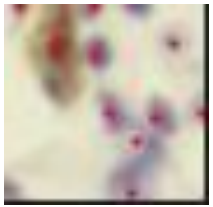


Post division(One region)

List of Tasks/Modules

2)Preprocessing all the images:

- Grayscaling, Pixel level balancing, Denoising and segmentation were performed.



List of Tasks/Modules

3)Neural Networks implemented:

Imbalanced dataset measures taken:

- Equal number of images used(by reducing the larger class images)
- Class weighting technique applied. Higher weightage to class with lesser number of images.

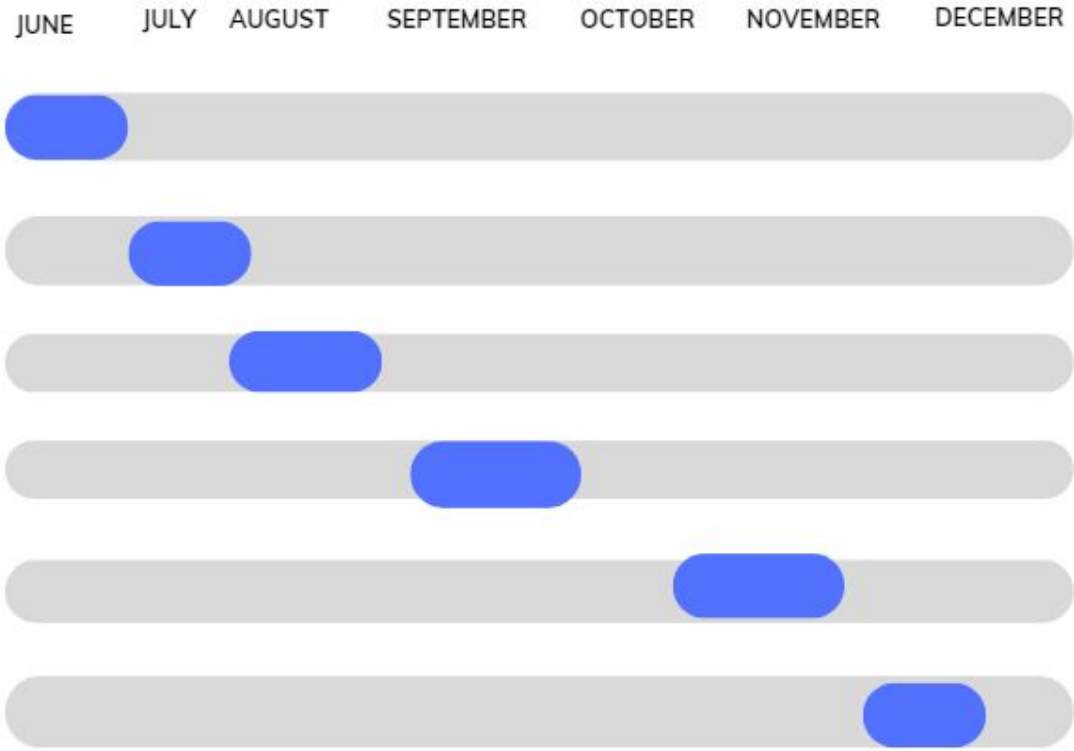
Individual Contribution

Name	Task/Module	Number of lines of code	Time spent
Disha	1)Dataset Creation 2)Preprocessing 3)DenseNet	1) 80 2) 95 3) 87	1) 6 weeks 2) 1.5 weeks 3) 2 weeks
Srushti	1)Dataset Creation 2)Preprocessing 3)CNN	1) 80 2) 95 3) 74	1) 6 weeks 2) 1.5 weeks 3) 2 weeks
Mihir	1)Further literature Survey on models to be implemented 2) VGG-16	90	1) 4 weeks 2) 2 weeks
Prarthana	1)Further literature Survey on models to be used 2)Alexnet	79	1) 4 weeks 2) 2 weeks

Demonstration and Testing of the Modules Completed

Modules	Weighted networks	Equalised dataset
CNN	90.33	89.20
DenseNet	69.03	68.47
VGG-16	69.26	68.27
Alexnet	69.04	69.21

PHASE - II


JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
1)FURTHER LITERATURE SURVEY
2)LOW-LEVEL DESIGN
3)FEATURE EXTRACTION
4)IMPLEMENTATION AND CLASSIFICATION
5)EVALUATION OF METRICS
6)FINAL REPORT

References

[1]Hu B, Liu Y, Chu P, Tong M, Kong Q. Small Object Detection *via* Pixel Level Balancing With Applications to Blood Cell Detection. Front Physiol. 2022 Jun 17;13:911297. doi: 10.3389/fphys.2022.911297. PMID: 35784879; PMCID: PMC9249342.

[2]BEN AHMED, Ikram (2022): Hybrid UNET Model Segmentation for an Early Breast Cancer Detection using Ultrasound Images. TechRxiv. Preprint. https://doi.org/10.36227/techrxiv.19704895.v1

[3]Mari, Kamarasan & Santhakumari, V. (2020). Early Detection of Breast Cancer using Image Processing Techniques: A Study on Mammogram Image Analysis. XII. 2266-2296.

[4]Accurate Screening for Early-Stage Breast Cancer by Detection and Profiling of Circulating Tumor Cells
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Thank
You