EE5180: Introduction to Machine Learning

Detection of Breast Cancer using Infrared Thermal Imaging

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1   Problem Formulation

Incidents of breast cancer have been on a tremendous rise. Popular methods of detection like mammography are expensive and have associated downsides including but not limited to lack of accuracy in the detection of the exact spot of malignancy, ill-effects of exposing the body to X-ray radiations etc. It is known fact that animal cells require oxygen for differentiation. The malignant tumour (undifferentiated mass of cells) consumes a lot of oxygen in order to proliferate rapidly. This leads to temperature variations around the point(s) of malignancy. These variations can be observed much before the actual disease manifests itself. The motivation for using thermal imaging roots from this fact. Thermal cameras have been used to capture the temperature profile of the breast, which will further be analysed and classified. **In conclusion, the objective of this project is to develop a system that processes thermal images of the breast of a given person and detects if the person has cancer or not.**

2   Related Works

There are two parts to this problem. Firstly, the captured images need to be cropped, filtered and processed carefully. Secondly, the image is classified based on the presence or absence of the malignant tumour, the latter being

our primary concern. Contemporary learning techniques like Logistic Regression, Back Propagation Neural Networks(BPNN) and Radial Basis Function Network (RBFN) have been widely employed. In addition to these, detection using electromagnetic models, Ultra Wide band technology, logistic generalised additive models and signal processing models have showcased a high degree of accuracy.

3   Roadmap

To start with, we have planned to do a literature survey, which we will present as a part of the project proposal. Following that, we will do a binary classification (the two possible decisions being, either the person has cancer or the person does not have cancer) on the data set using ML algorithms that have been used in literature. We will do a tertiary classification(the decisions being, the person has cancer, the person may have cancer and the person does not have cancer) if time permits.

4   References

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