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SURVEY OF CERVICAL CANCER PREDICTION USING MACHINE LEARNING

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Presentation Outline

- Introduction
- Literature survey
- Objectives
- System Architecture
- Implementation
- Methodology
- Results and Discussion
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Introduction

- Cervical cancer is one of the deadliest cancers recognized
- A malignant disease which develops in the cells of the uterus
- The Cancer is undetected until the final stages – no symptoms
- Implements Gaussian Mixture Model and Probabalistic Neural Network
- Advanced attempt for early precancerous screening equipment
- More accurate

Literature Review

AUTHOR	YEAR OF PUBLICATION	DESCRIPTIONS	PROS	CONS
[1] P.Mohanaiah , P. Sathyanarayana , L.Gurukumar "Image Texture Feature Extraction using GLCM Approach" , International Journal of Scientific and Research Publication, Volume 3, Issue 5, May 2013	2013	• Captures visual content of images for indexing and retrieval • Uses GLCM for extraction of textures	• High Discrimination accuracy • Real time pattern recognition	• More Computation
[2] Imran S. Bajwa, M. Shahid Naweed, M. Nadim Asif, S.Irfan Hyder "Feature Based Image Classification by using Principal Component Analysis", CIST – Journal of Graphics, Vision and Image	2013	• Principal Component Analysis provides enhanced accurcy for cloud precipitation • Characteristically used for image recognition	• Classifier system designed to exhibit enhancement	• Used only for weather application

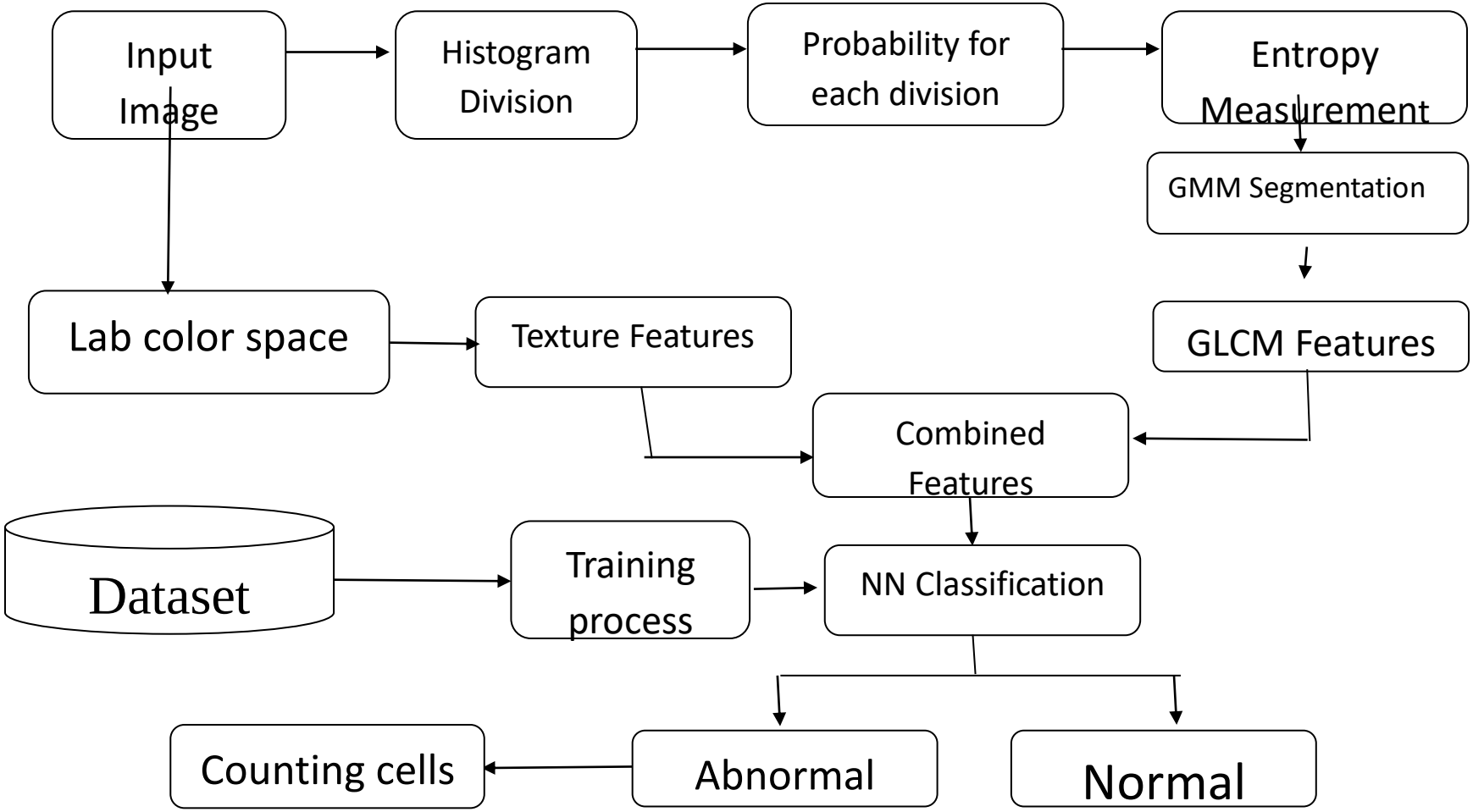
Literature Review

[3]Jyoti Patil and Anant. L. Chaudhari, "Intensity Observation of cervical cytology using DIP", International Journal of Applied Information Systems (IJAIS) – ISSN : 2249-0868 Foundation of Computer Science FCS, New York, USA Volume 4– No.4, October 2012	**2012**	• **Application of finding Key features within an image utilizing PCA** • **Uses many mathematical and statistical processes**	• **Compares images which will be termed authentic and imposter images**	
[4] D S Guru, Y.H. Sharath, S. Manjunath "Texture Features amd KNN in Classifiaction of Flower Images" , s IJCA Special issue on "Recent Trends in Image Processing and Pattern Recognition".	2010	• Algorithmic model for Automatic classification of flowers using KNN classifier	• Qualitative comparitive analysis • Good performance	• Not real time

Objectives

- Motivated by the necessity of high accuracy when dealing with a human life.
- Computer assistance improves the results of humans in such a domain.
- Due to large number of patients and cost the conventional method fails
- So Automated classification of cervical magnetic resonance images is proposed
- Uses Histogram Division
  - Entropy Measurement
  - Lab color space
  - GLCM Features
  - NN Classification
  - GMM- segmentation

System Architecture



Implementation

REQUIREMENTS

- Matlab 2104a and above
- Image Processing Toolbox
- Windows 7 and above
- Minimum 2GB of ram
- Minimum 250GB hard disk

CERVICAL MODEL

- In order to test the validation of any imaging method, a model that represents the main tissues of the cervix is needed.

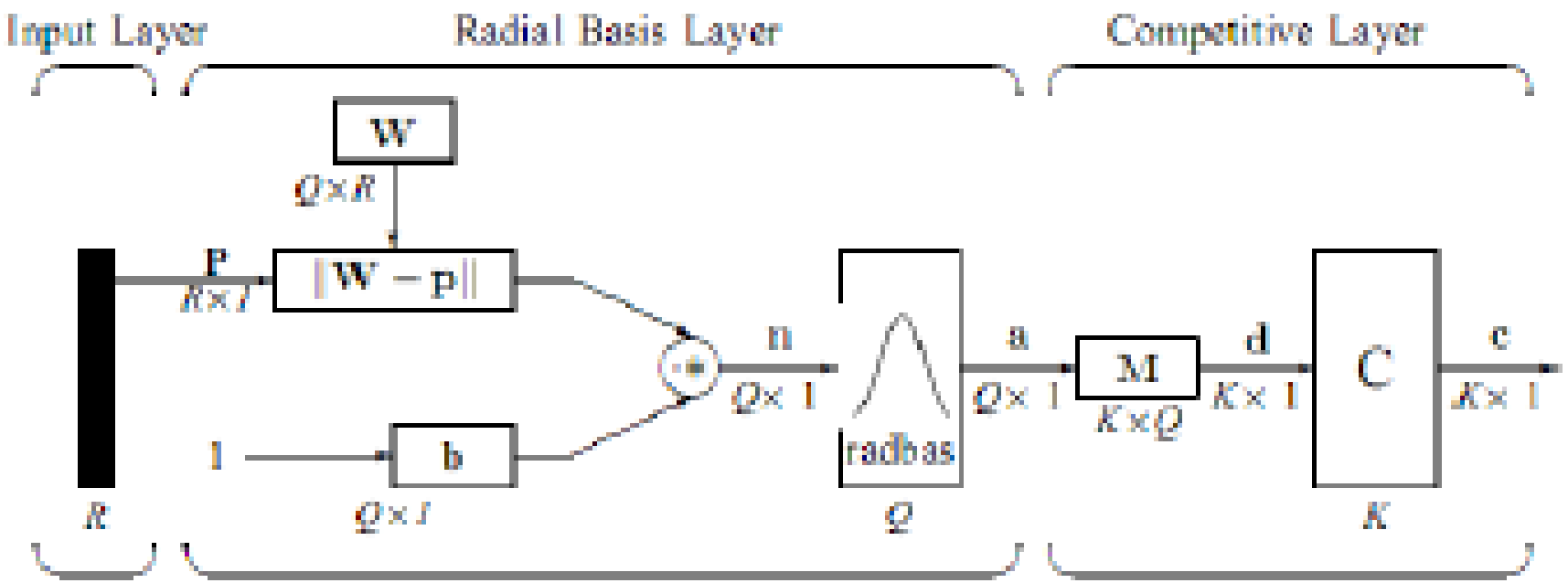
DATA MODEL

- The stored data that represents those scattered signals are segmented into 500 samples for each prob.
- The signature of the tumor is hidden in those data.

USED NEURAL NETWORK

- Neural network is the best tool in recognition and discrimination between different sets of signals.
- It has an input layer with 2000 inputs,
- First hidden layer with 11 nodes and T ANSIG transfer function
- Second hidden layer with 7 nodes, and T ANSIG transfer function
- Output layer with PURELIN transfer function and 2 outputs.
- One of the two outputs is used for the detection of tumor, and the other for the localization

PROPOSED NEURAL NETWORK



REMOVING UNNECESSARY NEURONS

- DTREG provides an option to cause it remove unnecessary neurons from the model after the model has been constructed
- The process of removing unnecessary neurons is an iterative process.
- Leave-one-out validation or the neuron that causes the least increase in error is then removed from the model
- The process is repeated with the remaining neurons until the stopping criterion is reached.

Methodology

- **GAUSSIAN MIXTURE MODEL**

For a probability model determination, we can suppose to have mixture of Gaussian distribution as the following form:

$$f(x) = \sum_{i=1}^{k} p_i N(x \mid \mu_i, \sigma_i^2)$$

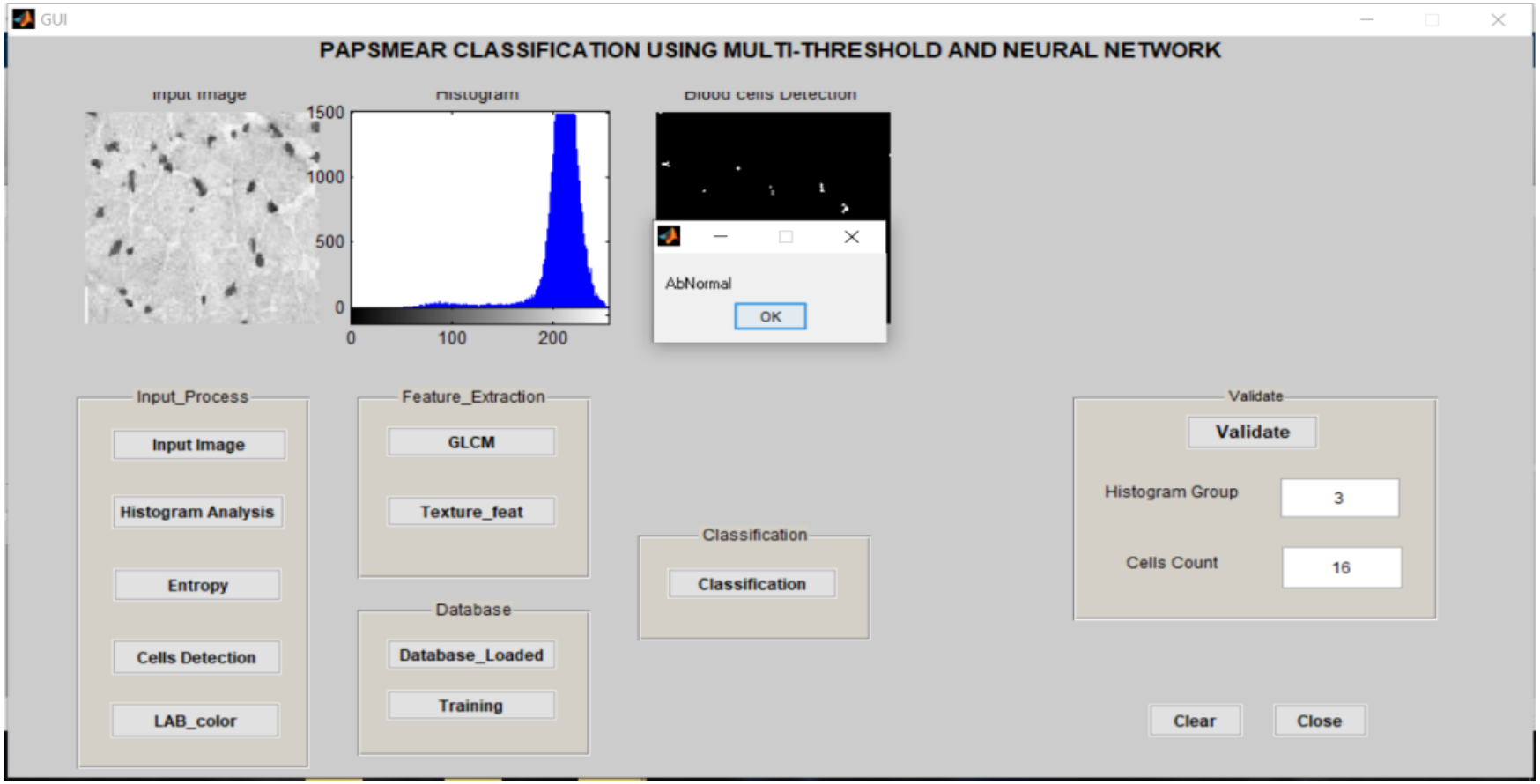
- **GRAY-LEVEL CO-OCCURRENCE MATRIX**

The graycomatrix function creates a gray-level co-occurrence matrix (GLCM) by calculating how often a pixel with the intensity (gray-level) value *i* occurs in a specific spatial relationship to a pixel with the value *j*.

- Model requires converting the image into a format capable of being manipulated by the computer.
- The MR images are converted into matrices form by using MATLAB.
- The NN is used to classify the MR images.
- NN classifier presented good accuracy, very small training time, robustness to weight changes, and negligible retraining time.
- Performance based on the result will be analyzed at the end of the development phase.

Results and Discussion

CLASSIFICATION



Conclusion

- In the fig.Classification the inputted image is classified whether normal or abnormal and the histogram group and cell count are validated to show the number of cells.
- In test image the features are extracted to classify the image.
- The same features will be extracted in the data set image
- By these set of features we can classify the input image is normal or abnormal.
- Based on the training the neural network, the detection is achieved.

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3) Imran S. Bajwa, M. Shahid Naweed, M. Nadim Asif, S. Irfan Hyder “Feature Based Image Classification by using Principal Component Analysis”, CIST – Journal of Graphics, Vision and Image processing.
4) Jyoti Patil and Anant. L. Chaudhari, “Intensity Observation of cervical cytology using DIP”, International Journal of Applied Information Systems (IJAIS) – ISSN : 2249-0868 Foundation of Computer Science FCS, New York, USA Volume 4– No.4, October 2012
5) Schmeelk .S, Schemeelk J “Image authenticity implementing Principal Components Analysis (PCA)” , IEEE 2013 Emerging Technologies for a Smarter World (CEWIT) pp: 1-4
6) Jianfeng Ren,Yuntao Shen, Songhui Ma, Lei Guo “ Applying Multiclass SVMs into Scene Image Classification” , Innovations in Applied Artificial Intelligence (2004) pp: 924-934
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Questions & Answers