

In This Issue...

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- **Machine Learning** in Breast Cancer Detection and Diagnosis
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Dear friends! **COMPSIG NITT** is a monthly newsletter to share the research work done in the Pattern recognition and computational intelligence laboratory, Department of Electronics and Communication Engineering, National Institute of Technology Trichy.

Concepts, Ideas pertaining to Computational intelligence, Pattern recognition and Signal processing are also included in this newsletter.

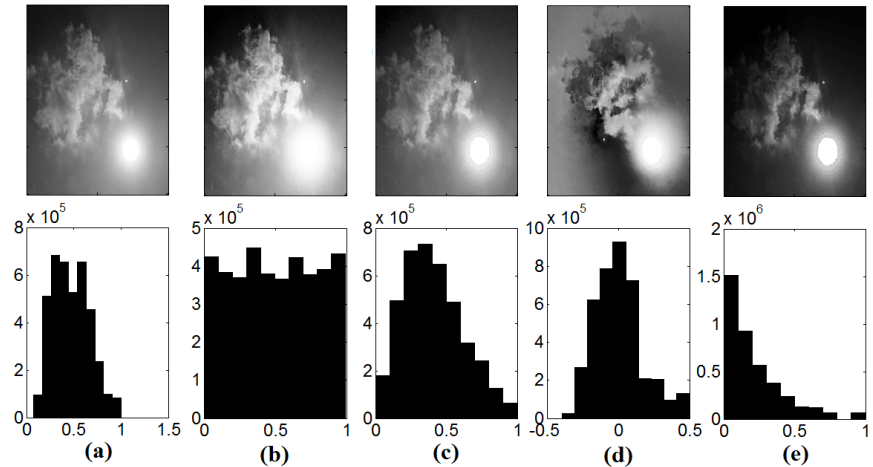
We expect the feedback, comments and articles from you all.

Issue 3-5: May 2017

Team members

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Illustration



The figure shows images with different distributions and their corresponding histograms. (a) Arbitrary distribution, (b) Uniform distribution, (c) Rayleigh distribution, (d) Gaussian distribution and (e) Exponential distribution

Steps to obtain various distributions from an arbitrary distribution:

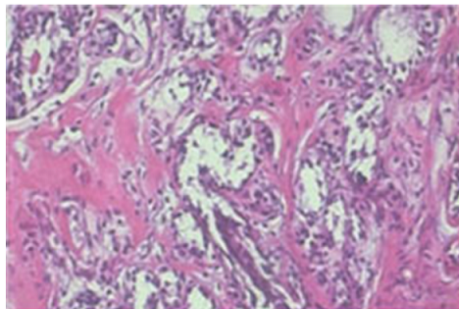
- Arbitrary distribution to Uniform distribution using Histogram equalization
- Rayleigh distribution from uniform distribution.
 - Consider X (pixel intensities) to be uniformly distributed between 0 to 1. Let $R=g(X)$ be the Rayleigh function where $g(x) = \sqrt{2\sigma} \sqrt{\ln(\frac{1}{1-x})}$.
- Gaussian distribution from Rayleigh distribution
 - The Gaussian distribution function is given as $G = R \cos(\theta)$.
 - This needs two uniformly distributed data, one to obtain Rayleigh distribution R and the other to be used in $\cos(\theta)$.
 - Trick is to collect the uniformly distributed data column wise for Rayleigh distribution and row wise for getting the outcome for θ , such that both the data are independent.
- Exponential distribution from Uniform distribution
 - If X is uniformly distributed between 0 to 1 then, $Y = \frac{1}{\lambda} \ln(\frac{1}{1-x})$ is exponentially distributed.

Link to the M file pertaining to this illustration: <http://silver.nitt.edu/~esgopi/mfiles/Imagedistributions/> [Back to Contents](#)

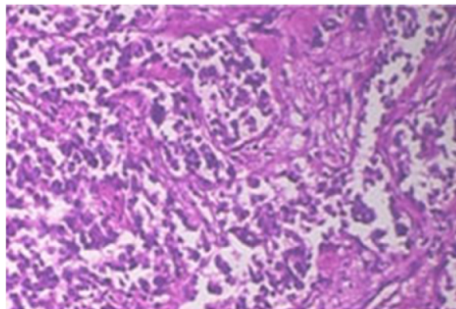
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Breast Cancer Detection and Diagnosis using Machine Learning

Breast Cancer (BC) diagnosis is done by pathologists applying visual inspection. Hence there is pressing need for computer aided diagnosis to relieve the workload on pathologists by filtering obviously benign areas, so that the experts can focus on the more difficult-to-diagnose cases.



(a) Benign tumour



(b) Malignant tumour

Image Courtesy: *Dataset for Breast Cancer Histopathological Image Classification*

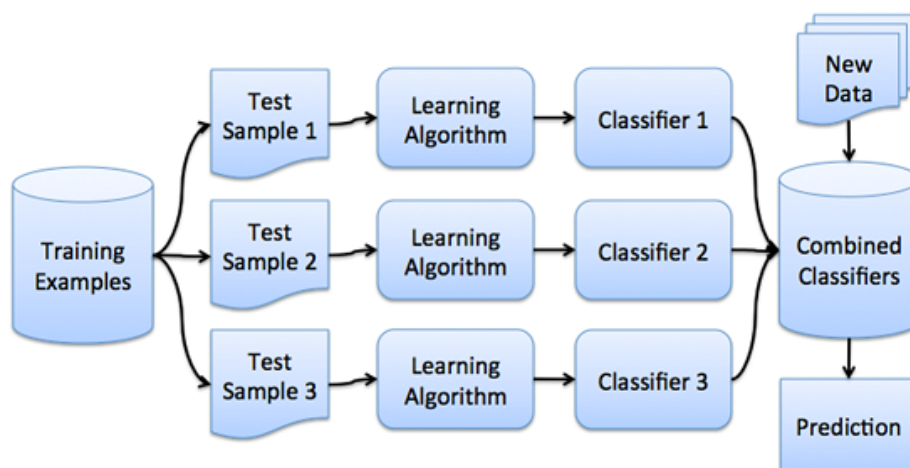


Image Courtesy: http://cse-wiki.unl.edu/wiki/index.php/Bagging_and_Boosting

A statistical method of examining texture that considers the spatial relationship of pixels is the Gray-Level Co-occurrence Matrix (GLCM). Using the statistical measures of GLCM, a feature vector is formed. K-LDA is used in image processing application to bring intra-class vectors as close as possible and inter-class centroids as far as possible. After mapping the feature vectors into higher dimensions, ensemble method classifier is used to train and classify the data. Ensemble methods are techniques that create multiple models and then combine them to produce improved results. The ensemble method used in this work is bagging method. Here the data is divided into parts. Each part is used to train separate classifier. For testing, the testing vector is fed into all the classifiers, and its class is determined using majority vote method.

For further details contact Mr. Ankur Satpute, M.Tech, Communication systems (mail id: ankur182709@gmail.com)

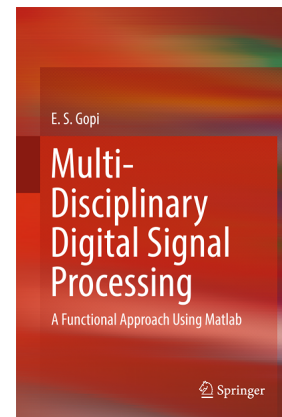
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Quotes

"To succeed in your mission, you must have single-minded devotion to your goal" — Dr. A.P.J. Abdul Kalam

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Coming up soon



The above book authored by Dr. E. S. Gopi, provides a comprehensive overview of digital signal processing for a multi-disciplinary audience and all the techniques are illustrated using MATLAB. For further information, visit: <http://springer.com/us/book/>

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Feedback

COMPSIG NITT invites articles and innovative ideas from readers for the [Reader's Space](#) column. We expect feedback and comments to monthly newsletter [COMPSIG NITT](#). Readers can share their views in our facebook page, "[COMP-SIGNITT](#)". Those who are interested can be a part of the facebook group.

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