



## **“Exploring Deep Learning Techniques for Digital Image Processing”**

**10-08-2024**

**Online Mode**

**Sri Sai Ram Engineering College**

**(An Autonomous Institution, Affiliated to Anna University, Chennai)**


**Chennai-44**





IEEE Signal Processing Society in association with Electronics and Communication Engineering, Sri Sai Ram Engineering College organized a session on “ **Exploring Deep Learning Techniques for Digital Image Processing**” on 10<sup>th</sup> August 2024 from 6:00pm to 7:00pm through Google Meet platform. The event commenced with warm welcome by Mr T. Sivasakthi (SEC IEEE SPS Advisor). After that speaker Mr. **T.Raghuram- Software Engineer, Multicoreware, Chennai** explained about the various algorithms about deep learning and gave few insights about neural networks, convolutional neural networks the session went on very interesting and interactive. The vote of thanks was given by V.Vijay bala (SEC IEEE SPS Vice Chair).

Number of participants: 30





Event Poster:

**SAIRAM**  
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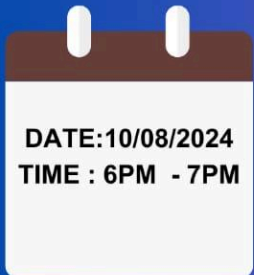


Department of Electronics and Communication Engineering

SEC IEEE SPS Presents


Seminar on

**Exploring Deep Learning Techniques  
for Digital Image Processing**



**DATE:10/08/2024**  
**TIME : 6PM - 7PM**

**Mode : Online**  
Gmeet Link :<https://meet.google.com/pqd-cbjm-mxc>



**Resource Person**  
**Mr.T.Raghuram**  
**Software Engineer**  
**Multicoreware - Chennai**

Student Co-ordinators :

<b>Mahalakshmi S</b> IV/ECE	<b>Vijay Bala V</b> IV/ECE	<b>Aakash K</b> IV/ECE	<b>Monikha K</b> III/ECE	<b>Kaviyarasi S</b> III/ ECE
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<b>Mr.T. Sivasakthi</b> Strategist/Advisor IEEE SPS SEC	<b>Dr.S.Brindha</b> IEEE Student Branch Counselor SEC	<b>Dr.J.Thamilselvi</b> HOD-ECE SEC	<b>Dr.J.Raja</b> Principal SEC	<b>Dr.Sai Prakash LeoMuthu</b> Chairman & CEO Sairam Institutions
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## Event pictures:

Meet - IEEE SPS SEC

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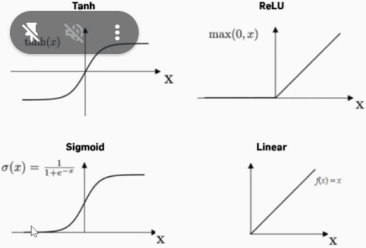
All Bookmarks

Raghuram T (Presenting)

### Introduction to neural network

**Activation Functions:**

- Purpose:** Activation functions introduce non-linearity into the neural network, allowing it to learn and represent complex patterns. Without non-linear activation functions, the network would only be able to represent linear transformations, regardless of its depth.
- Common Functions:**
  - Sigmoid
  - ReLU (Rectified Linear Unit)
  - Tanh (Hyperbolic Tangent)



6:16 PM | IEEE SPS SEC

Participants: SIVASAKTHI T, Raghuram T, VIJAY BALA V, Aakash, 18 others, MAHALAKSHMI S

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Raghuram T (Presenting)

### Backward propagation

**Loss Functions:**

A **loss function** is a function that **compares** the target and predicted output values; measures how well the neural network models the training data. When training, we aim to minimize this loss between the predicted and target outputs; Ex. **Mean Squared Error, Mean Absolute Error**

**Optimizers:**

Optimizers are algorithms or methods used to **minimize an error function**(loss function)or to maximize the efficiency of production. Optimizers are mathematical functions which are dependent on model's learnable parameters i.e Weights & Biases. Optimizers help to know how to change weights and learning rate of neural network to reduce the losses. Eg: gradient descent.

$$W_{new} = W_{old} - \alpha * \frac{\partial(Loss)}{\partial(W_{old})}$$

Where alpha- learning rate

Srikanth thiyagarajan has left the meeting

gradient descent takes into the direction of the local minimum are determined by the move towards the optimal weights.

6:17 PM | IEEE SPS SEC

Participants: SIVASAKTHI T, Raghuram T, VIJAY BALA V, Aakash, 17 others, MAHALAKSHMI S

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R Raghuram T (Presenting)

## Convolution Neural Network(CNN)

Convolutional Neural Network (CNN) is the extended version of artificial neural networks (ANN) which is predominantly used to extract the feature from the grid-like matrix dataset. For example visual datasets like images or videos where data patterns play an extensive role.

**CNN architecture:** Convolutional Neural Network consists of multiple layers like the input layer, Convolutional layer, Pooling layer, and fully connected layers. The Convolutional layer applies filters to the input image to extract features, the Pooling layer downsamples the image to reduce computation, and the fully connected layer makes the final prediction. The network learns the optimal filters through backpropagation and gradient descent.

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## Training Deep Learning Models

### Data Preparation

- Image Preprocessing Techniques:**
  - Normalization:** Scaling pixel values to a standard range (e.g., 0 to 1).
  - Resizing:** Adjusting image dimensions to match the input size required by the model.
  - Cropping:** Removing unwanted parts of the image to focus on the region of interest.
  - Color Space Conversion:** Changing the image color space (e.g., RGB to grayscale).
- Data Augmentation:**
  - Purpose:** Increase the diversity of the training dataset and reduce overfitting.
  - Techniques:**
    - Rotation:** Rotating the image by a certain angle.
    - Scaling:** Zooming in or out of the image.
    - Flipping:** Horizontal or vertical flipping of the image.
    - Translation:** Shifting the image horizontally or vertically.

**Confusion Matrix:** A confusion matrix is a performance measurement tool used to evaluate the performance of classification models. It provides a detailed summary of the prediction results by comparing the predicted labels to the actual labels. This matrix is particularly useful for understanding the types of errors made by the model and how well it performs across different classes.

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