



## **Report on: 'Introduction to CNN and its Use for Image Classification'**

**Topic:** Workshop on “Introduction to Convolutional Neural Networks (CNN) and its Use for Image Classification”

**Date:** 28<sup>th</sup> September 2021

**Time:** 5:00 - 7:00 p.m.

**Venue:** Zoom Meeting (Online Platform)

**Speaker:** Dr. Bhakti Vilas Baheti (Postdoctoral Researcher, Department of Radiology, Perelman School of Medicine, Pennsylvania , USA ).

**No. of participants attended:** 45

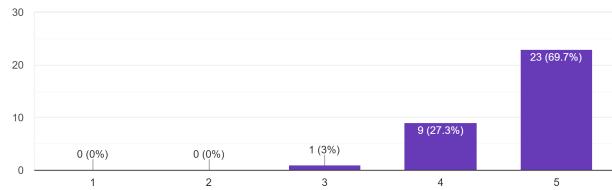
### **Description:**

- On 28<sup>th</sup> September 2021, IEEE-DBIT Student Branch organized a hands-on workshop on “Introduction to Convolutional Neural Networks (CNN) and its Use for Image Classification”.
- The session commenced by Ajitha Rajkumar(IEEE-DBIT-Chairperson), addressing the participants and welcoming the speaker, Dr. Bhakti Vilas Baheti to deliver the talk.
- Following the introduction, the speaker began the workshop by giving a brief introduction to machine learning flow.
- The session continued with the introduction of new parameters like artificial intelligence, deep learning, and its applications, architecture of convolutional neural networks, optimization of performance parameters, CNN for image classification.
- Dr. Bhakti Vilas also stated the ingredients for deep learning are data, computation, and algorithms.
- The speaker also gave a detailed explanation on training and testing of CNN network and various procedures involved like input layer, hidden layer, weights, biases, an output layer, and loss functions.
- Comparisons of various CNN Architectures were done with respect to size,accuracy, and parameters.

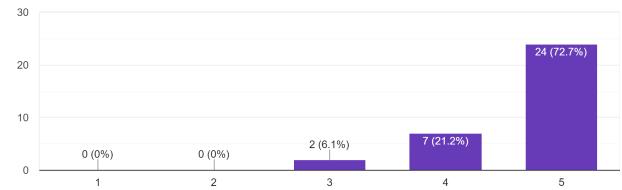
- The speaker also emphasized the usage of dropout which helps in reducing overfitting in CNN architectures.
- Further, the speaker provided hands-on experience via Google collab with an example of flower classification using CNN.
- Dr. Bhakti Vilas explained all the concepts included in the code like epoch, batch size, model fit, and created a model for training and also did testing of the model and obtained the accuracy.
- The session was followed by a Q&A round with the participants wherein the speaker answered the queries such as increasing the dataset will give higher accuracy, how to increase accuracy, CNN which algorithm to use, what is an epoch, and so on.
- The session concluded with the proposal of the vote of thanks by Mr. Prathamesh Yerekar, (IEEE-DBIT-Event Management Head).

## Feedback Analysis:

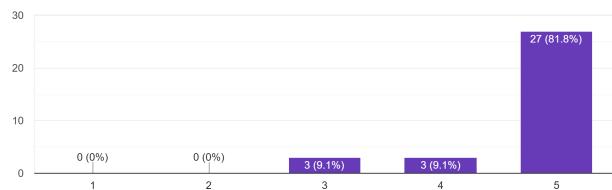
The session was relevant to the audience and well Organized  
33 responses



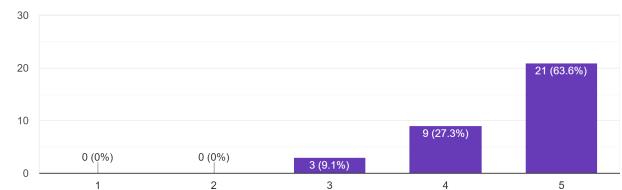
The Speaker responded to questions in an informative, appropriate and satisfactory manner  
33 responses



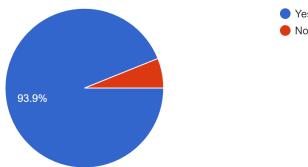
Overall, the session was informative and valuable  
33 responses



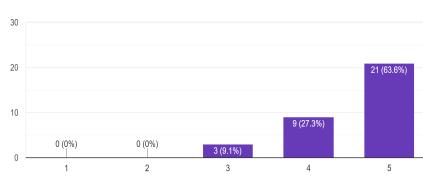
Did you understand the architecture of the convolutional neural network?  
33 responses



Are you interested in participating in future talks or workshops which fall in this category?  
33 responses



Did you understand the concept and optimization of performance parameters?  
33 responses



## **Feedback Summary:**

From the above analysis, we can infer that the overall reception to the workshop was quite positive and the participants found the session to be very satisfactory, and informative. It introduced various terms involved in CNN. The higher majority of students are from EXTC followed by IT. Further, many participants were quite optimistic about attending such similar sessions in the future.

## **Event Poster:**

The event poster is for a workshop titled "Introduction to CNN and its Use for Image Classification". It features the logos of IEEE - DBIT Student Branch and DBIT. The speaker is Dr. Bhakti Vilas Baheti, a Postdoctoral Researcher at University of Pennsylvania. The topics covered include Introduction to Deep Learning for Computer Vision, Architecture of Convolutional Neural Network, Optimization of Performance Parameters, and CNN for Image Classification. The event date is 28-09-2021, from 5pm-7pm. It is open for all DBIT BE students. Social media links for YouTube, Facebook, Instagram, and LinkedIn are provided, along with the handle /IEEE\_DBIT.

**DON BOSCO INSTITUTE OF TECHNOLOGY, MUMBAI**

**“Introduction to CNN and it's Use for Image Classification”**

**Speaker:**  
**Dr. Bhakti Vilas Baheti**  
Postdoctoral Researcher at University of Pennsylvania

**Topics to be covered:**

- Introduction to Deep Learning for Computer Vision
- Architecture of Convolutional Neural Network
- Optimization of Performance Parameters
- CNN for Image Classification

**Date: 28-09-2021**  
**Time: 5pm-7pm**

**OPEN FOR ALL DBIT BE STUDENTS**

**/IEEE\_DBIT**

## Event Photographs :

AI - ML - DL

**Artificial Intelligence**

**Machine Learning**

**Deep Learning**

The subset of machine learning composed of algorithms that permit software to train itself to perform tasks like speech and image recognition, by exposing millions of training networks to vast amounts of data.

Any technique that enables computers to mimic human behavior, such as learning logic, if-then rules, decision trees, and more, using learning (including deep learning)

Deep Learning

Hierarchical Representation

Features in DNN

(a) Low level features      (b) Mid level features      (c) High level features

Machine Learning Flow

**Training**

Training Labels → Image Features → Training → Learned model

**Testing**

Test Image → Image Features → Learned model → Prediction

Deep Learning Applications

Semantic Segmentation

Instance Segmentation

Label each pixel of an image by the object class that it belongs to, such as human, sheep, and grass in the example.

Datasets: PASCAL, COCO

```

m1 = Sequential([
    DataAugmentation(),
    Layers.Input(shape=(224, 224, 3)),
    Layers.Conv2D(32, kernel_size=(3, 3), activation='relu'),
    Layers.MaxPooling2D(),
    Layers.Conv2D(64, kernel_size=(3, 3), activation='relu'),
    Layers.MaxPooling2D(),
    Layers.Conv2D(128, kernel_size=(3, 3), activation='relu'),
    Layers.MaxPooling2D(),
    Layers.Flatten(),
    Layers.Dense(128, activation='relu'),
    Layers.Dense(10, activation='softmax')
])
    
```

**Comparison of Various CNN Architectures**

Model	Size	Top-1 Accuracy	Top-5 Accuracy	Parameters
InceptionV3	92 MB	0.779	0.937	23,851,784
InceptionResNetV2	215 MB	0.803	0.953	55,873,736
MobileNet	16 MB	0.704	0.895	4,253,864
MobileNetV2	14 MB	0.713	0.901	3,538,984
DenseNet121	33 MB	0.750	0.923	8,062,504
DenseNet169	57 MB	0.762	0.932	14,307,880
DenseNet201	80 MB	0.773	0.936	20,242,984
NASNetMobile	23 MB	0.744	0.919	5,326,716
NASNetLarge	343 MB	0.825	0.960	88,949,818

Note: The top-1 and top-5 accuracy refers to the model's performance on the ImageNet validation dataset.

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**Fully Connected Layer**

- Initial layers of the CNN act as feature extractor and their output is further fed into a fully connected neural network structure that drives the final classification decision.
- They connect every neuron in one layer to every neuron in another layer.
- It is same as the traditional Artificial Neural Network (ANN) in principle. These layers are computationally expensive and prone to overfitting.

Convolution Neural Network (CNN)

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**Activation Functions**

- Convolution layer performs only linear operations on the input.
- The purpose of the activation function is to introduce non-linearity into our network.

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**Thank you**

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Google Scholar: <https://tinyurl.com/2u6b3k9h>

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**Report Approved By:** Prof. Gejo George (IEEE-DBIT-SB Counselor)