Bidesh Banerjee

1. **Introduction** - Good Morning to one and all present over here, today I Bidesh Banerjee and my group stand before you for a presentation on -
   Topic Name - Artificial Vision System for Meat Quality Gradation.
2. **Problem Statement Describe** - We have developed a system which will be able to assess the meat quality in real-time.
3. **Importance of the work** - Meat consumption is increasing day by day, so determining the freshness and quality of the meat is a primary concern among consumers as spoiled food can cause serious illnesses in people. And after covid, many people are ordering food items online, especially meat and fish. This has increased the necessity for real-time meat quality assessment through images.
4. **Dataset Description**
5. **Color Space Description**
   HSV color space is preferred over RGB during image classification problems in Deep Learning or Machine Learning because it provides a better representation of the color and brightness of the image. In the RGB color space, the color information and brightness information are combined in a single channel, which makes it difficult for the network to distinguish between the two. The HSV color space separates the color information and brightness information into separate channels, which makes it easier for the network to learn and make accurate predictions.
6. **Introduce Arunima** - Now I will call Chanda to explain the machine learning models we used to solve this problem.

Shubhodeep Chanda

1. **Introduction** - Thank you Bidesh. Continuing on our discussion.
2. Describe 4 Machine Learning Models.
3. Explain their summary.
4. **Introduce Arunima.**

Arunima Chaudhuri

1. **Introduction** - Thank you Chanda.
2. **Dataset Description**
3. **Describe 3 Deep Learning Models.**

   For all of the deep learning models, we used the Sequential model in Keras interface of the TensorFlow framework. The Sequential model in Keras is a linear stack of layers used to create simple neural networks with no branching or merging of layers.

   CNN -

   - A Convolutional Neural Network (CNN) is a type of deep neural network commonly used to analyse image and video data.
   - In a CNN, the input image is processed by a series of convolutional and pooling layers that extract increasingly complex features from the image.

- Optional - (The convolutional layers create a feature map that highlights where certain features are present in the input image. The pooling layers then downsample the feature maps, reducing their dimensionality while retaining important information.)
- We used Conv2D layers from Keras with ReLu Activation Function.

ResNet-

- ResNet, short for Residual Network, is a deep neural network architecture that uses residual connections to address the vanishing gradient problem during training.
- More effective and efficient neural networks that can achieve better performance on a wide range of tasks, such as image classification and object detection.
- We used ResNet50 with three layers of Dense Neural Network, where 2 layers with ReLu and one layer with Sigmoid activation function

DenseNet-

- DenseNet is a type of convolutional neural network architecture where each layer receives inputs from all previous layers concatenated together, resulting in a dense connectivity pattern.
- It uses dense connections between layers, allowing for efficient parameter usage and improved gradient flow.
- We used Dense layers with the ReLu activation function.

Debdoot Roy Chowdhury

1. **App Development**
2. **Conclusion**
3. **Future Work**

Difference b/w Convolution Layer and Dense Layer

A convolutional layer is a type of layer used in convolutional neural networks that applies a set of filters to an input to produce a set of output feature maps.
In contrast, a dense layer is a type of layer used in feedforward neural networks that connects every neuron in one layer to every neuron in the next layer.
Convolutional layers are specifically designed to work with spatial data, such as images, where local patterns are important, while dense layers are more general and can work with any type of data.

Pooling Layer

A pooling layer in a convolutional neural network is a downsampling operation that reduces the spatial dimensions of the feature maps by summarizing local activations, such as max or average, in a small neighborhood. This helps to extract the most important features, reduce overfitting, and make the network more efficient.

Activation Function
An activation function is a mathematical function applied to the output of a neuron in a neural network, which determines whether the neuron should be activated (i.e., whether the output of the neuron should be propagated to the next layer) or not, based on a threshold value. Common activation functions include the sigmoid, ReLU, and softmax functions.

Flattening
In deep learning, flattening is a process of transforming a multidimensional input tensor into a one-dimensional tensor, which can be fed to a neural network's fully connected layers. It is usually done after convolutional and pooling layers in a convolutional neural network (CNN) to convert the output feature maps into a one-dimensional feature vector. Flattening helps to preserve spatial information from the input image and reduces the number of parameters in the model.

Batch Norm
Batch normalization (batch norm) is a technique used in neural networks to improve the training stability and speed. It involves normalizing the inputs of each layer by subtracting the batch mean and dividing by the batch standard deviation. This helps to reduce internal covariate shift, which can lead to faster convergence and better performance. It is typically applied after the activation function in each layer.

Learning Rate
Learning rate is a hyperparameter in machine learning algorithms that determines the step size taken in each iteration while moving toward a minimum of a loss function, controlling how much to adjust the model in response to the estimated error every time the model weights are updated.
A high learning rate may cause the model to converge quickly but may result in unstable behavior or suboptimal solutions, while a low learning rate may cause slow convergence or may get stuck in local minima.

Loss Function
In machine learning, a loss function (also known as a cost function or objective function) is used to quantify the difference between the predicted values and actual values of a model. The goal is to minimize the value of the loss function so that the model can make more accurate predictions.