**Problem Statement**: There were approximately 5000 coloured images of animals in 512 by 512 pixels. The problem was to display ‘n’ number of most similar photo of an image from this dataset.

**Solution**:

I made the use of a convolutional auto-encoder, to do the above task.

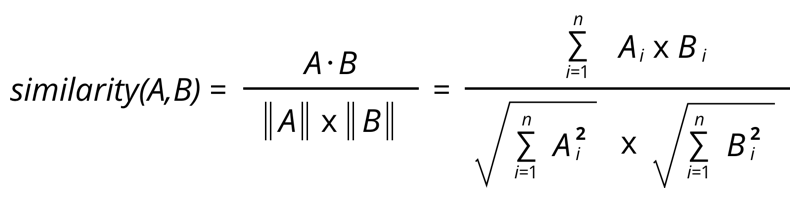
**Auto-encoder**: Auto encoder is used to reduce the dimensionality of a given input, the reduced dimensionality is called the **code,** the size of the input image provided to the auto-encoder was 160x160x3=76800, the dimensions of the code layer was **150**, this layer consists of all the relevant details of the input image.

**Cosine-Similarity**: I then used Cosine Similarity concept to find the cosine value of each image with every other image, and then arranged them in a descending order.

The higher the value of cosine the more the similarity.

**Clustering:** I used K-Means Clustering algorithm, by applying it on the image embedding, and then clustered the images.

COSINE SIMILARITY:



**ARCHITECHTURE OF THE AUTO-ENCODER:**

Model: "AE"

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Layer (type) Output Shape Param #

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input\_1 (InputLayer) [(None, 160, 160, 3)] 0

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conv2d (Conv2D) (None, 160, 160, 32) 896

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max\_pooling2d (MaxPooling2D) (None, 80, 80, 32) 0

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conv2d\_1 (Conv2D) (None, 80, 80, 16) 4624

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max\_pooling2d\_1 (MaxPooling2 (None, 40, 40, 16) 0

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conv2d\_2 (Conv2D) (None, 40, 40, 8) 1160

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max\_pooling2d\_2 (MaxPooling2 (None, 20, 20, 8) 0

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flatten (Flatten) (None, 3200) 0

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dense (Dense) (None, 150) 480150

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batch\_normalization (BatchNo (None, 150) 600

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dense\_1 (Dense) (None, 3200) 483200

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batch\_normalization\_1 (Batch (None, 3200) 12800

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reshape (Reshape) (None, 20, 20, 8) 0

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conv2d\_3 (Conv2D) (None, 20, 20, 8) 584

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up\_sampling2d (UpSampling2D) (None, 40, 40, 8) 0

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conv2d\_4 (Conv2D) (None, 40, 40, 16) 1168

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up\_sampling2d\_1 (UpSampling2 (None, 80, 80, 16) 0

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conv2d\_5 (Conv2D) (None, 80, 80, 32) 4640

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up\_sampling2d\_2 (UpSampling2 (None, 160, 160, 32) 0

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conv2d\_6 (Conv2D) (None, 160, 160, 3) 867

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Total params: 990,689

Trainable params: 983,989

Non-trainable params: 6,700

Project by-

**Anuj Balodi**