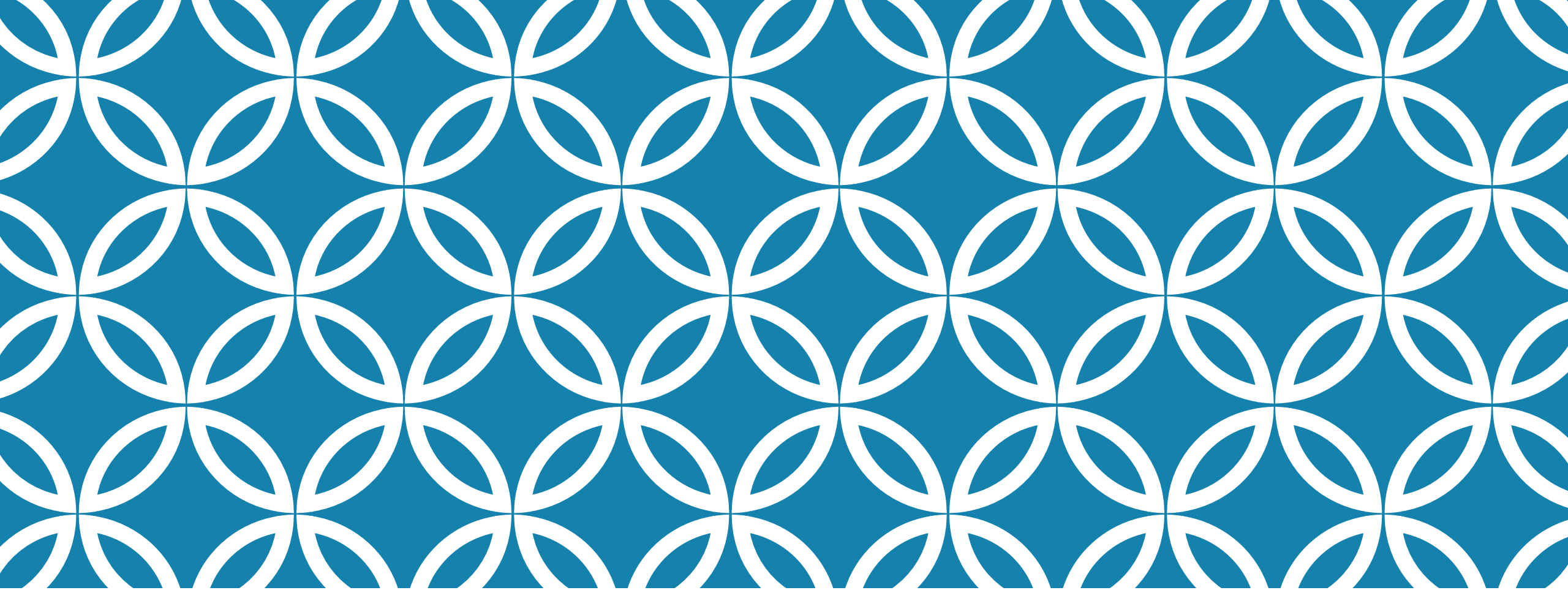


# COVID-19 DETECTION FROM SCARCE CHEST X-RAY IMAGE DATA USING FEW-SHOT DEEP LEARNING APPROACH

# DATASET

dataset-1: Covid-19 Radiography database.It consists of 1200 COVID-19 positive images, 1341 normal images, and 1345 viral pneumonia images.

dataset-2: This data consists of 317 labeled images into three categories: Viral Pneumonia, Normal, and Covid.

# DATA AUGMENTATION TECHNIQUES

Shear

Zoom

Rotation

# MODELING APPROACHES

- Baseline Model : Logistic regression
- Convolutional neural networks
- Transfer learning
- Unsupervised learning based models
  - t-SNE and PCA
  - K-means clustering
  - Gaussian mixture model clustering
- Few shot learning using siamese networks

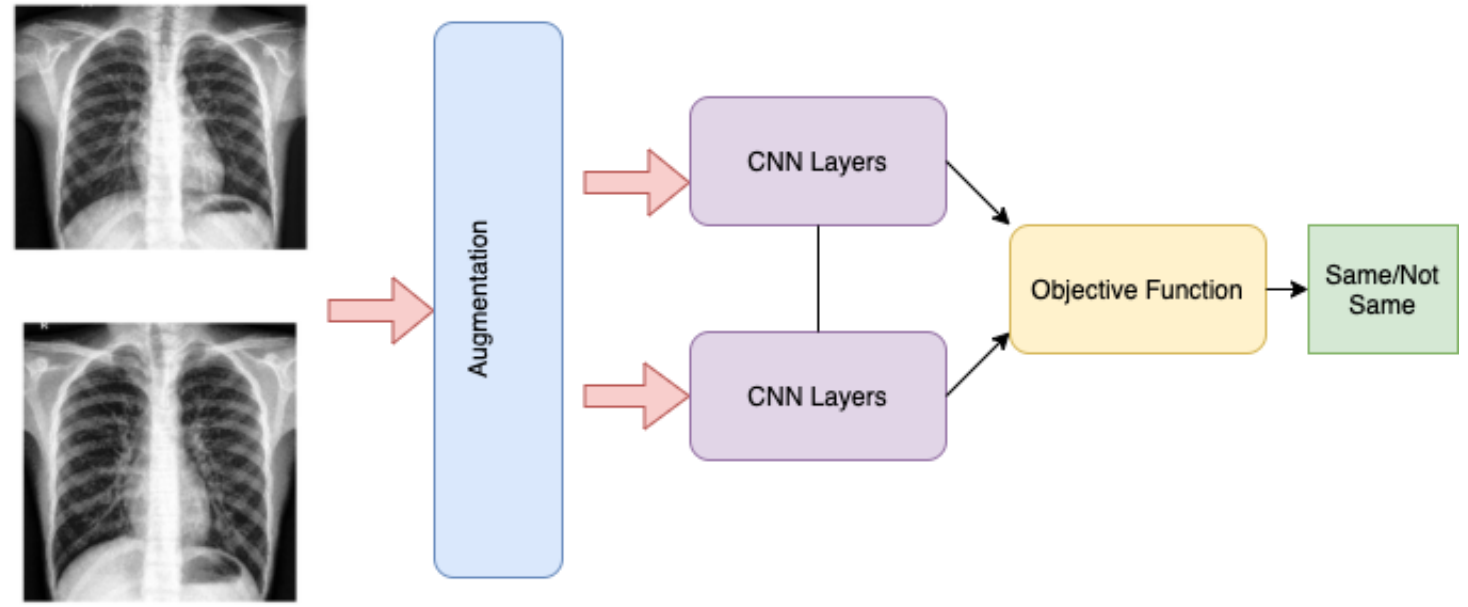
# EVALUATION METRICS

1. Accuracy
2. Precision
3. Recall
4. F1 Score
5. Silhouette score

# SIAMESE NETWORK

- **Input :** pairs of images and a label whether they belong to same class or not.
- **Hypothesis:** If model is trained well and if pair of images are similar then their feature vectors are also similar.
- **Propsed network :** siamese networks and siamese networks with transfer learning.
- In this paper author took advantage of transfer learning.
- **Output:** Same / not same.

# ARCHITECTURE



# RESULTS

| Model Name | Accuracy | Precision | Recall | F1-score |
|---|---|---|---|---|
| Logistic Regression | 82.4% | 0.822 | 0.828 | 0.828 |
| Convolutional Neural Network | 90.2% | 0.912 | 0.901 | 0.904 |
| Transfer Learning(VGG16) | 93.3% | 0.931 | 0.932 | 0.928 |
| Siamese Networks | 94.6% | 0.945 | 0.941 | 0.947 |
| Siamese Networks(Transfer Learning) | **96.4%** | **0.965** | **0.962** | **0.959** |

Vgg 16 trained on Imagenet dataset is used as feature extractor in propsed network.

# LINKS

**Paper**
https://arxiv.org/abs/2102.06285

**Code** : https://github.com/shruti-jadon/Covid-19-Detection