

# RankIQ Implementation

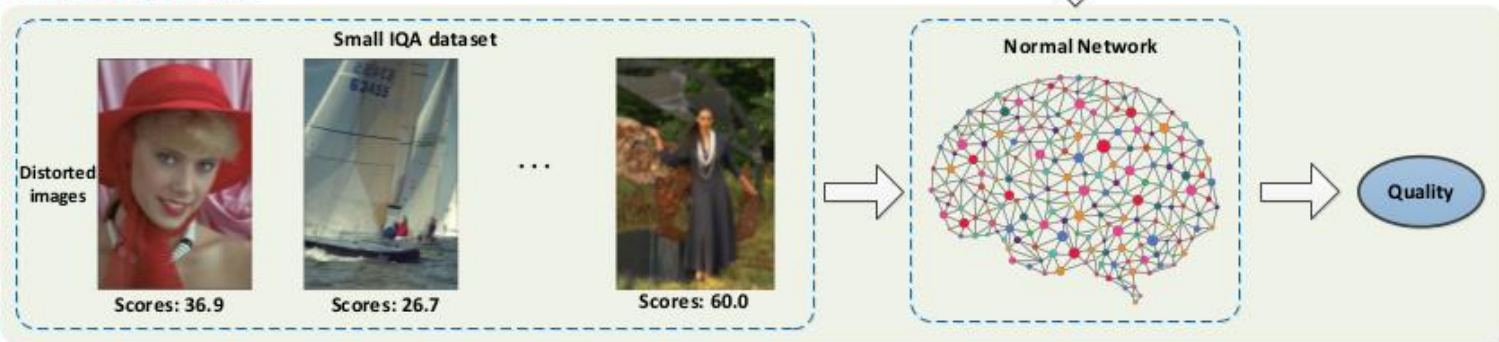
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The diagram illustrates the proposed Siamese network architecture for image ranking. It is divided into two main parts: a 'Large ranking dataset' and a 'Siamese Network'.

**Large ranking dataset:** This part shows two rows of images. The top row is labeled 'Gblur' and the bottom row is labeled 'JPEG'. Each row contains a sequence of images showing a gradual degradation in quality, indicated by greater-than symbols (>) and an ellipsis (...). The first image in each row is sharp, while the last image is significantly blurred or distorted. An arrow points from this dataset to the Siamese Network.

**Siamese Network:** This part shows two identical neural network structures, each represented by a brain icon with a network of nodes and edges. A double-headed arrow between the two networks is labeled 'Shared weights', indicating that they share the same parameters. An arrow points from the Siamese Network to an oval labeled 'Ranking'.



# Dataset

For this project, we had to prepare two datasets:

Ranked dataset : Waterloo dataset

~ 99k images (Originally 4.5k images)

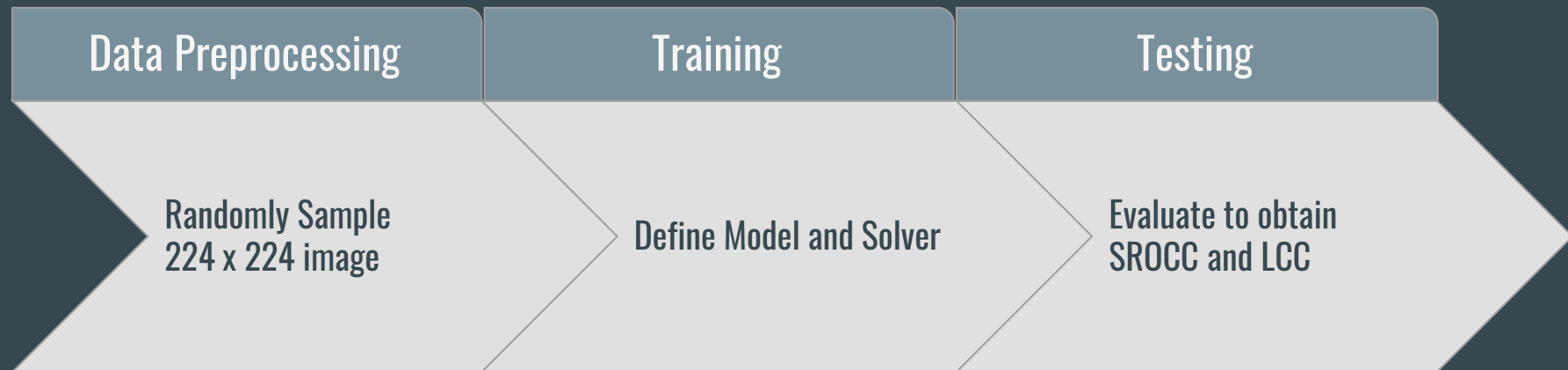
IQA dataset : LIVE Dataset

~ 1000 images (Originally 30 images)

# Dataset Details

- LIVE dataset generated four types of distortion at five levels
  - Gaussian Blur
  - White Noise
  - JPEG Compression
  - JPEG2000 Compression
  - Fastfading
- Ranking dataset had these distortions over a range of intensities.
  - Gaussian Blur
  - Gaussian Noise
  - JPEG Compression
  - JPEG2000 Compression

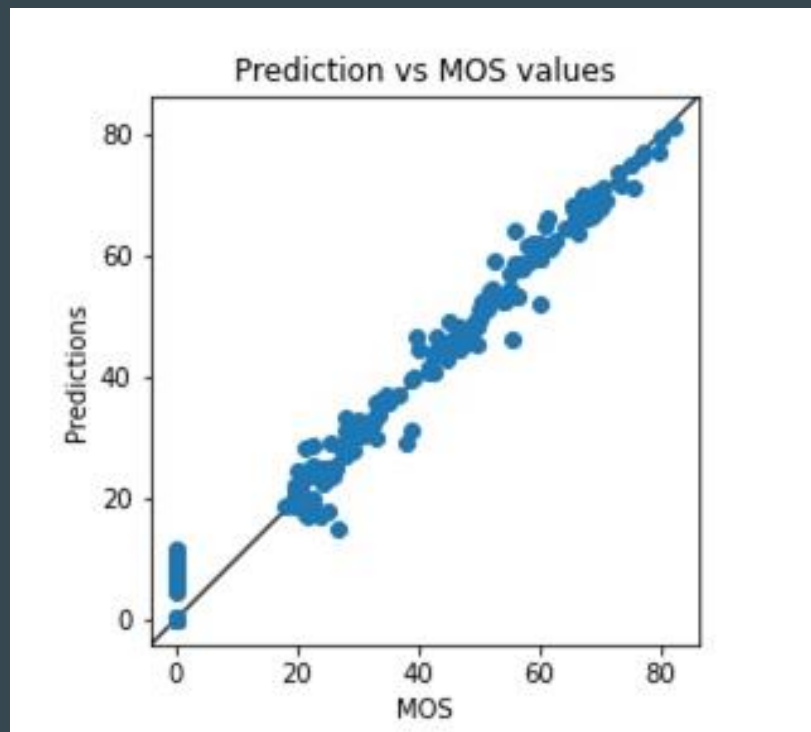
# Pipeline



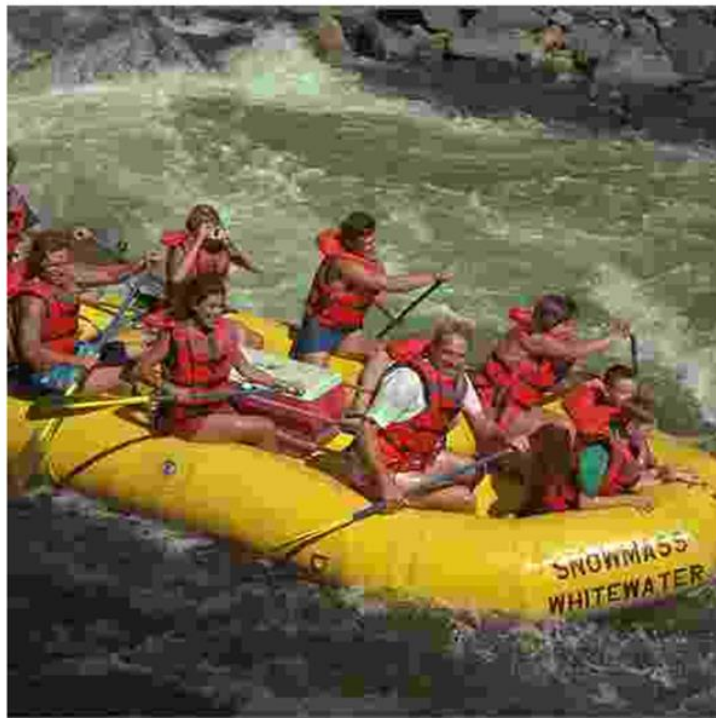
# Testing results

SROCC = 0.9871

LCC= 0.9902



# Distorted Image



MOS = 70.96

Pred = 69.15

# Reference Image



# Testing on KonIQ Dataset (model trained on LIVE)

KonIQ-10k is the largest IQA dataset to date consisting of 10,073 quality scored images.

We used 263 images in the test set.

SROCC : 0.55245

LCC : 0.55823

With fine tuning, these values can be improved to a great extent.



# RankIQ Applications

- **Ultrasound volume projection image quality selection by ranking from convolutional RankNet.**
  - Computerized Medical Imaging and Graphics (2021)
- **Quality Difference Ranking Model for Smartphone camera photo quality assessment.**
  - IEEE International Conference on Multimedia and Expo Workshops (2020)
- **Residual Networks based distortion classification and ranking for Laparoscopic image quality assessment.**
  - IEEE International Conference on Image Processing (2020)

**Thank You**