Handout 04 Perceptual Image Quality Assessment (II)

1. Basic Concepts

(1) For the no reference image quality assessment (NR-IQA) problem, the high quality reference image is not given; typical NR-IQA methods can be roughly classified into two categories, opinion-aware and opinion-unaware according to whether they need a training dataset comprising distorted images and subjective scores to train the model.

(2) According to the availability of the reference information, IQA problems can be roughly classified into three categories, including full-reference IQA (FR-IQA), reduced-reference IQA (RR-IQA), and no-reference IQA (NR-IQA).

(3) For a typical NR-IQA method, at the training stage, feature vectors are extracted from images and then the regression model, mapping the feature vectors to the subjective scores, is learned; at the testing stage, a feature vector is extracted from the test image, and its quality score can be predicted by inputting the feature vector to the learned regression model.

(4) NIQE is an opinion-unaware NR-IQA approach recently proposed, which consists of an offline learning stage and a testing stage. Offline learning stage: constructing a collection of quality-aware features from pristine images and fitting them to a multivariate Gaussian (MVG) model $M$; Testing stage: the quality of a test image is expressed as the distance between a MVG fit of its features and $M$.

(5) IOUML is another effective NR-IQA method proposed by our group, which is highly inspired by the success of NIQE; more types of quality-aware NIS (natural image statistics) features are proposed; a visual saliency guided pooling strategy was proposed to reflect the different importance of different regions. The following figure shows the flowchart of IOUML method.
2. Matlab Programming

(1) Study the demo program “NIQE”; download two images, compute their quality indices with NIQE and to see whether the objective quality predicted by NIQE is in consistent with human ratings.