**Paper review of:   
Multi-Contrast Super-Resolution MRI Through a Progressive Network**

* Gives a summary of the application domain of the paper

A summary of the application domain of this paper would be the use of a one-level non-progressive neural network and a two-level progressive neural network to sample multi-contrast super-resolution (SR) MRI images. The non-progressive network is used for low up-sampling and the two-level progressive network is used for high-up sampling.

The paper has three main contributions which will be described to give more detail:

1) The Wasserstein generative adversarial network with gradient penalty(WGAN-GP) architecture which is used in the two-level progressive neural that can obtain excellent MCSR results with the use of a high up-sampling factor

2) When combining multi-contrast information in a high-level feature space leads to a significantly improved results over the combination in the low level pixel space

3) The contribution of a composite loss function including the mean-squared-error (MSE), perceptual loss and a texture matching loss to ensure that the generated images are able to recover texture details and are faithful to the ground truth.

* Gives a summary of the used (Machine Learning) methodology and evaluation metrics

The methodology is divided in five sections including:

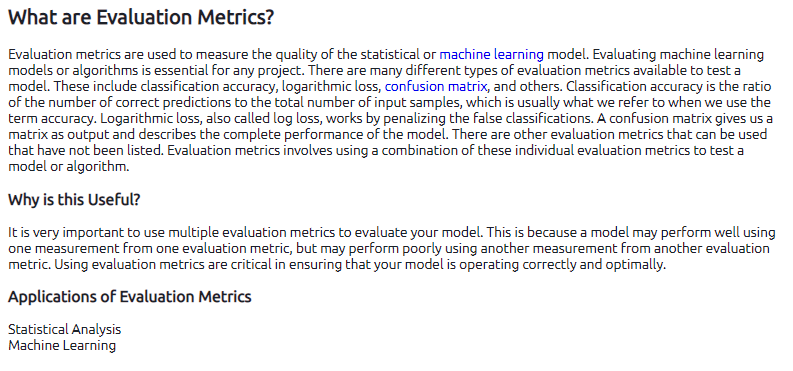
1. The overall super-resolution process.
2. Down-sampling and Zero-Filling.
3. The one-level non-progressive network.
4. The objective function.
5. The two-level Progressive network.

In section 1 the overall super-resolution process is described. In their previous single-image super-resolution study a deep learning framework to achieve MRI SR imaging with complementary image priors

‘The proposed networks integrate multi-contrast information in a high level feature space and optimize the imaging performance by minimizing a composite loss function, which includes mean-squared-error, adversarial loss, perceptual loss, and textural loss.’

‘The structural similarity (SSIM), peak signal-to-noise ratio (PSNR) [37] and information fidelity criterion (IFC) [43] **metrics** are used to evaluate the image quality of MCSR results.’

* Discusses the strong and weak points of the methodology and evaluation metrics



* Suggests alternative methodology, evaluation metrics and ideas for improvement