NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

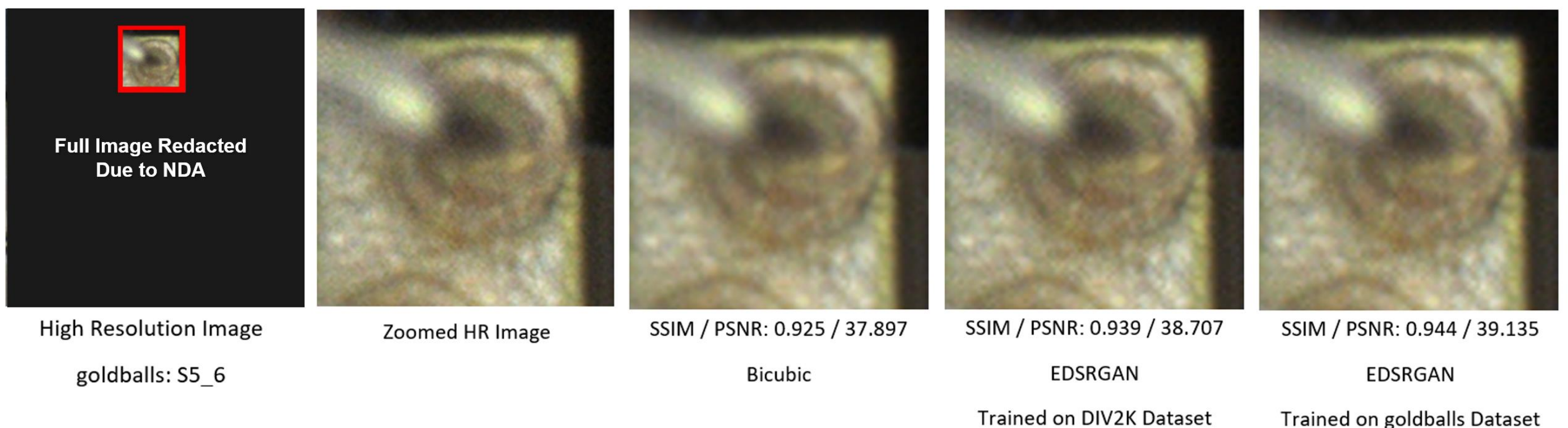School of Computer Science and Engineering
College of Engineering

Deep Learning For Defect Detection
(Super-Resolution)

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High Resolution Image
goldballs: S5_6

Zoomed HR Image

SSIM / PSNR: 0.925 / 37.897
Bicubic

SSIM / PSNR: 0.939 / 38.707
EDSRGAN
Trained on DIV2K Dataset

SSIM / PSNR: 0.944 / 39.135
EDSRGAN
Trained on goldballs Dataset

Project Overview:

In the field of defect detection, image quality often influences whether a defect is detected or not. However, obtaining high resolution images on the manufacturing line is often costly. In this project, we determine if deep learning-based methods of super resolution are beneficial to defect detection by implementing several deep learning-based methods and evaluating them extensively to determine if improvements can be made. Additionallly, we propose a new method EDSRGAN that combines the approaches of the state-of-the-art method EDSR and GAN finetuning method of SRGAN. Our method managed to obtain superior performance over EDSR by producing textures of better perceptual quality and clearer images with sharper edges.

Super Resolution Web Application:

During the course of the project, a web user interface was created to enable user to make use of super-resolution technologies without interacting with the code.

User Interface Functions:

- Prepare Low Resolution Data
- Train Deep Learning Models
- Apply Deep Learning Super Resolution
  - On a Single Image
  - On a Batch of Images