Case Study 3:

Application of One-Shot Recognition using Siamese Convolution Neural Network for Steel Surface Detection

(Detailed Case Study Report)

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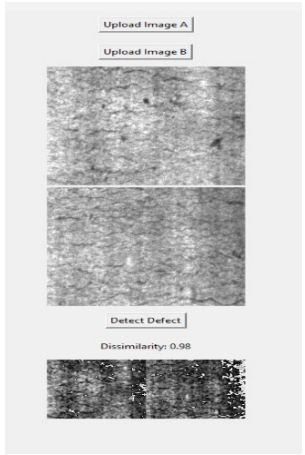
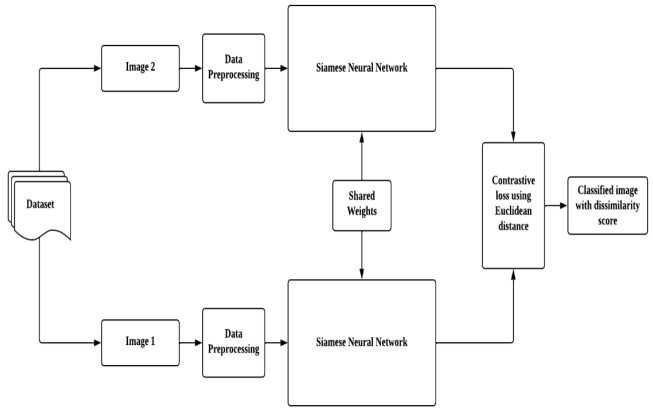
Material quality management is critical in the field of industrial manufacturing. One of the industries is steel manufacture. The steel surface flaws can have a significant impact on the structural integrity leading to product quality. A novel Siamese neural network (SNN) is used to evaluate the dissimilarity of surface flaws in steel. The SNN offers possible path toward automated defect diagnosis due to ability of detecting minute feature variations and it can identify complex difference in surface imperfection. This algorithm improves on the conventional defect identification procedure by automatically locating the defect and quantifying the differences in steel surfaces.

A user-friendly and interactive graphical user interface (GUI) is developed using Tkinter framework in Python. The GUI facilitates accessibility and usability.

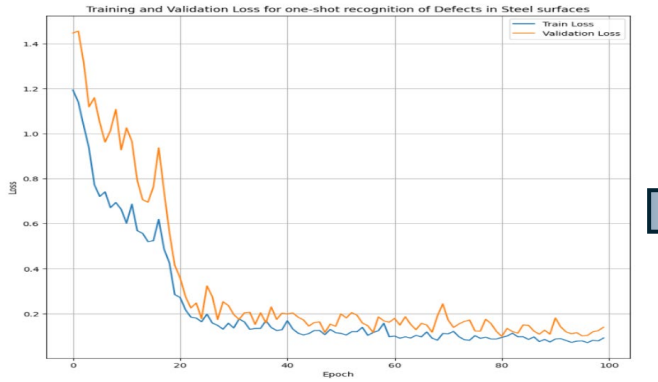
Keywords – Siamese neural network, Convolutional neural network, Steel surfaces, Defects, Dissimilarity, Dissimilarity score, Tkinter, Graphical user interface



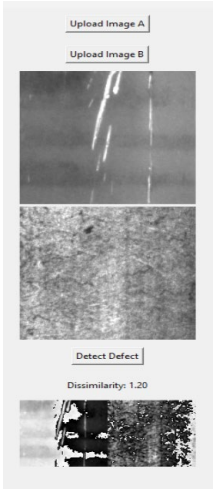
Tkinter framework: GUI



Methodology Flow Chart



Training and Validation Loss Curve



Dissimilarity score of two images.