

Claims:

1. A computer-implemented process for creating an object detection model using neural networks to increase inspection efficiency comprising at least one high performance processor, Fast access memory and several parallel graphic processing units, the method comprising:

an uncompressed high resolution image of the object;

preprocessing the image by applying smoothing algorithms to enhance defect information without compressing the pixel data;

Segmenting the pre-processed image and performing dimension normalisation by reconstructing them into square areas, best suited for input to the graphic processing unit;

applying deep learning algorithms to the optimised images to extract feature information within each image to aid in machine learning and training;

classifying the extracted and calibrated feature information under several categories through the application of neural networks;

re-classifying the categories of extracted features from new images generated through application of Generative adversarial networks to the optimised and uncompressed images;

creating an extensive database of extracted features detected within the images for micro defect inspection in uncompressed images;

applying neural networks in combination with the domain knowledge database to inspect new devices at high speed and efficiency.

2. The computer-implemented method of claim 1, further comprising removal of redundant data not relevant to the defect being inspected.

3. The computer-implemented method of claim 1, further comprising removal of redundant data and replacing it with dark pixels to enhance accuracy of the neural network.

4. The computer-implemented method of claim 1, further comprising extracting the edge of a circular object and transposing it horizontally with overlapping areas so of extracting the edge of a circular object and unwrapping it into a horizontal line and then, dividing this line into multiple segments with overlapping areas so as not to miss any pixel information when joining two adjacent edges.

5. The computer-implemented method of claim 4, further comprising the process of stacking each horizontal area one above the other to create a normalised square image for further analysis.

6. The computer-implemented method of claim 5, wherein the image is processed using deep learning modules for training, analysis or inspection of the object depending upon the process step at any given time.

7. The computer-implemented method of claim 1, further comprising tracing the contour of a circular object and dividing the circular area into several overlapping squares optimised for input to the Graphic processing unit.

8. The computer-implemented method of claim 7, wherein the process of extracting the overlapping the square areas and filling all redundant pixels outside the circular edge with Black pixels is performed to improve accuracy.

9. The computer-implemented method of claim 8, wherein the process of analysing and categorising the extracted features and characteristics of defects is performed to further enhance the efficacy of the accumulated domain knowledge database.

10. The computer-implemented method of claim 9, wherein the defect inspection of new objects is performed in manufacturing using the domain knowledge built through deep learning modules to achieve high high accuracy and repeatability at high speed.