

4. The method of claim 1, wherein the confidence level is calculated with a voting scheme.
5. The method of claim 1, wherein the one or more training defects are manually classified with a real-time automatic defect classification (RT-ADC) scheme applied to the one or more attributes.
6. The method of claim 1, wherein the ensemble learning classifier comprises:
a random forest classifier.
7. The method of claim 1, wherein the ensemble learning classifier comprises:
a support vector machine (SVM).
8. The method of claim 1, wherein the generating a confidence threshold for each defect type of the one or more training defects based on a received classification purity requirement comprises:
generating a confidence threshold for each defect type of the one or more training defects based on a received classification purity requirement via a cross-validation procedure.

9. A method for determining defect type pair score comprising:

acquiring one or more images including a plurality of defect types, the plurality of defect types including a first defect type and at least a second defect type;

generating a first ensemble learning classifier for the first defect type and the at least a second defect type;

calculating, with the first ensemble learning classifier, a mean decrease in an accuracy index for each of a plurality of attributes associated with the first defect type and the at least a second defect type;

identifying a selected number of attributes having the largest mean decrease in accuracy index;

generating a second ensemble learning classifier with the identified selected number of attributes having the largest mean decrease in accuracy index;

determining a training error associated with the second generated ensemble learning classifier; and

calculating a defect type pair score associated with the first defect type and the second defect type based on the determined training error.

10. The method of claim 9, wherein at least one of the first ensemble learning classifier or the second ensemble learning classifier comprises:

a random forest classifier.

11. The method of claim 9, wherein the determining a training error associated with the second generated ensemble learning classifier comprises:

determining an out-of-bag error associated with the second generated ensemble learning classifier.

18. The method of claim 12, wherein the distributing defect data of at least the first defect type into N groups comprises:

randomly distributing defect data of at least the first defect type into N groups.

19. The method of claim 12, wherein the one or more training defects are manually classified with a real-time automatic defect classification (RT-ADC) scheme applied to the one or more attributes.

20. An apparatus for defect classification comprising:

an inspection tool, the inspection tool including one or more detectors configured to acquire one or more images of at least a portion of a specimen;

a user interface device;

a controller, the controller including one or more processors communicatively coupled to the one or more detectors of the inspection tool, wherein the one or more processors are configured to execute a set of program instructions stored in memory, the set of program instructions configured to cause the one or more processors to:

receive the one or more images from the one or more detectors of the inspection tool;

receive a signal from a user interface device indicative of a manual classification of one or more training defects of the specimen based on one or more attributes of the one or more training defects;

generate an ensemble learning classifier based on the received manual classification and the attributes of the one or more training defects;

25. An apparatus for determining defect type pair scores comprising:

an inspection tool, the inspection tool including one or more detectors configured to acquire one or more images of at least a portion of a specimen;

a user interface device;

a controller, the controller including one or more processors communicatively coupled to the one or more detectors of the inspection tool, wherein the one or more processors are configured to execute a set of program instructions stored in memory, the set of program instructions configured to cause the one or more processors to:

receive the one or more images from the inspection tool, the one or more images including a plurality of defect types, the plurality of defect types including a first defect type and at least a second defect type;

generate a first ensemble learning classifier for the first defect type and the at least a second defect type;

calculate, with the first ensemble learning classifier, a mean decrease in an accuracy index for each of a plurality of attributes associated with the first defect type and the at least a second defect type;

identify a selected number of attributes having the largest mean decrease in accuracy index;

generate a second ensemble learning classifier with the identified selected number of attributes having the largest mean decrease in accuracy index;

determine a training error associated with the second generated ensemble learning classifier; and

calculate a defect type pair score associated with the first defect type and the second defect type based on the determined training error.