CLAIMS

1. A processor implemented method comprising:

receiving a feature set (F) of a plurality of features associated with non-stationary audio signals;

receiving a training set comprising a plurality of non-stationary clean audio signals (C) and non-stationary noisy audio signals (N);

generating a unique and distinctive feature set (UF) based on the training set and the feature set (F);

dynamically generating an unbiased threshold of unique feature attribute value (UFAV) and polarity (P) associated with each of the unique and distinctive features of the unique and distinctive feature set (UF);

identifying a test signal as non-stationary noisy test signal or non-stationary clean test signal by statistical isolation based on (i) a unique feature attribute value (UFAV) and the polarity (P) associated with the test signal for each of the unique and distinctive features of the test signal and (ii) the dynamically generated unbiased threshold of the unique feature attribute value (UFAV) and the polarity (P) associated with each of the unique and distinctive features of the unique and distinctive feature set (UF); and

classifying the test signal further as one of lightly noisy test signal and highly noisy test signal based on one or more pre-defined conditions when the test signal is identified as the non-stationary noisy test signal.

2. The processor implemented method of claim 1, wherein generating the unique and distinctive feature set (UF) comprises:

extracting feature values from the plurality of non-stationary clean audio signals (C) and the non-stationary noisy audio signals (N) for each of the unique and distinctive features; and

classifying each feature from the feature set (F) as a unique distinctive feature of a unique distinctive feature set (UF) if one condition of: (i) a minimum feature value associated with one of the plurality of non-stationary clean audio signals (C) is greater than maximum feature value associated with one of the plurality of non-stationary noisy audio signals (N) by at least a first pre-determined percentage of the plurality of the non-stationary clean audio signals

(C) and at least a second pre-determined percentage of the plurality of the non-stationary noisy audio signals (N); and (ii) a minimum feature value associated with one of plurality of non-stationary noisy audio signals (N) is greater than maximum feature value associated with one of the plurality of non-stationary clean audio signals (C) by at least the first pre-determined percentage of the plurality of the plurality of non-stationary clean audio signals (C) and at least the second percentage of the plurality of the non-stationary noisy audio signals (N), is satisfied.

3. The processor implemented method of claim 2, wherein the first pre-determined percentage and the second pre-determined percentage is 90%.

4. The processor implemented method of claim 1, wherein the unique feature attribute value (UFAV) associated with each of the unique and distinctive features of the unique and distinctive feature set (UF) is a mean of (i) a median of values of the plurality of non-stationary clean audio signals for the unique and distinctive features and (ii) a median of values of the non-stationary noisy audio signals for the unique and distinctive features.

5. The processor implemented method of claim 1, wherein identifying the test signal as non-stationary noisy test signal or non-stationary clean test signal comprises one condition of:

bucketing the unique and distinctive features into a clean bucket (B_C) and a noisy bucket (B_N) based on a strict majority voting rule on cardinality of the clean bucket (B_C) and cardinality of the noisy bucket (B_N); and

bucketing the unique and distinctive features into clean bucket (B_C) and noisy bucket (B_N) based on a weighted majority voting rule on cardinality of the clean bucket (B_C) and cardinality of the noisy bucket (B_N).

6. The processor implemented method of claim 5, wherein classifying the non-stationary noisy test signal further as lightly noisy test signal comprises satisfying one condition from the one or more pre-defined conditions including:

cardinality of the clean bucket (B_C) is greater than cardinality of the unique and distinctive feature set (UF) by a first pre-determined value, wherein the clean

bucket (B_C) is one of a) the clean bucket (B_C) formed based on the weighted majority voting rule and b) the clean bucket (B_C) formed based on the strict majority voting rule; and

Euclidian distance between the unique feature attribute value (UFAV) and the values of the non-stationary noisy test signal associated with unique and distinctive features is lesser than the unique feature attribute value (UFAV) associated with each of the unique and distinctive feature set (UF) by a second pre-determined value in at least a part of the cardinality of the unique and distinctive feature set (UF); is satisfied.

7. The processor implemented method of claim 6, wherein the cardinality of the clean bucket (B_C) is not less than one third of the cardinality of the unique and distinctive feature set (UF).

8. The processor implemented method of claim 6, wherein the Euclidian distance between the unique feature attribute value (UFAV) and the values of the non-stationary noisy test signal associated with unique and distinctive features is not greater than 10% of the unique feature attribute value (UFAV) associated with the unique and distinctive features of the unique and distinctive feature set (UF) in at least 50% of the cardinality of the unique and distinctive feature set (UF).

9. A system comprising:

one or more data storage devices operatively coupled to one or more hardware processors and configured to store instructions configured for execution by the one or more hardware processors to:

receive a feature set (F) of a plurality of features associated with non-stationary audio signals;

receive a training set comprising a plurality of non-stationary clean audio signals (C) and non-stationary noisy audio signals (N);

generate a unique and distinctive feature set (UF) based on the training set and the feature set (F);

dynamically generate an unbiased threshold of unique feature attribute value (UFAV) and polarity (P) associated with each of the unique and distinctive features of the unique and distinctive feature set (UF);

identify a test signal as non-stationary noisy test signal or non-stationary clean test signal by statistical isolation based on (i) a unique feature attribute value (UFAV) and polarity (P) associated with the test signal for each of the unique and distinctive features and (ii) the dynamically generated unbiased threshold of the unique feature attribute value (UFAV) and the polarity (P) associated with each of the unique and distinctive features of the unique and distinctive feature set (UF); and

classify the test signal further as one of lightly noisy test signal and highly noisy test signal based on one or more pre-defined conditions when the test signal is identified as the non-stationary noisy test signal.

10. The system of claim 9, wherein the one or more hardware processors are further configured to generate the unique and distinctive feature set (UF) by:

extracting feature values from the plurality of non-stationary clean audio signals (C) and the non-stationary noisy audio signals (N) for each of the unique and distinctive features; and

classifying each feature from the feature set (F) as a unique distinctive feature of a unique distinctive feature set (UF) if one condition of: (i) a minimum feature value associated with one of the plurality of non-stationary clean audio signals (C) is greater than maximum feature value associated with one of the plurality of non-stationary noisy audio signals (N) by at least a first pre-determined percentage of the plurality of the non-stationary clean audio signals (C) and at least a second pre-determined percentage of the plurality of the non-stationary noisy audio signals (N); and (ii) a minimum feature value associated with one of the plurality of non-stationary noisy audio signals (N) is greater than maximum feature value associated with one of the plurality of non-stationary clean audio signals (C) by at least the first pre-determined percentage of the plurality of the plurality of non-stationary clean audio signals (C) and at least the second percentage of the plurality of the non-stationary noisy audio signals (N), is satisfied.

11. The system of claim 10, wherein the first pre-determined percentage and the second pre-determined percentage is 90%.

12. The system of claim 9, wherein the unique feature attribute value (UFAV) associated with each of the unique and distinctive features of the unique and distinctive feature set (UF) is a mean of (i) a median of values of the plurality of non-stationary clean audio signals for the unique and distinctive features and (ii) a median of values of the non-stationary noisy audio signals for the unique and distinctive features.

13. The system of claim 9, wherein the one or more hardware processors are further configured to identify the test signal as non-stationary noisy test signal or non-stationary clean test signal if one condition of:

bucketing the unique and distinctive features into a clean bucket (B_C) and a noisy bucket (B_N) based on a strict majority voting rule on cardinality of the clean bucket (B_C) and cardinality of the noisy bucket (B_N); and

bucketing the unique and distinctive features into a clean bucket (B_C) and a noisy bucket (B_N) based on a weighted majority voting rule on cardinality of the clean bucket (B_C) and cardinality of the noisy bucket (B_N);

is satisfied.

14. The system of claim 13, wherein the one or more hardware processors are further configured to classify the non-stationary noisy test signal further as lightly noisy test signal if one condition from the one or more pre-defined conditions including:

cardinality of the clean bucket (B_C) is greater than cardinality of the unique and distinctive feature set (UF) by a first pre-determined value, wherein the clean bucket (B_C) is one of a) the clean bucket (B_C) formed based on the weighted majority voting rule and b) the clean bucket (B_C) formed based on the strict majority voting rule; and

Euclidian distance between the unique feature attribute value (UFAV) and the values of the non-stationary noisy test signal associated with unique and distinctive features is lesser than the unique feature attribute value (UFAV) associated with each of the unique and distinctive feature set (UF) by a second pre-determined value in at least a part of the cardinality of the unique and distinctive feature set (UF);

is satisfied.

15. The system of claim 14, wherein the cardinality of the clean bucket (B_C) is not less than one third of the cardinality of the unique and distinctive feature set (UF).

16. The system of claim 14, wherein the Euclidian distance between the unique feature attribute value (UFAV) and the values of the non-stationary noisy test signal associated with unique and distinctive features is not greater than 10% of the unique feature attribute value (UFAV) associated with the unique and distinctive features of the unique and distinctive feature set (UF) in at least 50% of the cardinality of the unique and distinctive feature set (UF).

17. A computer program product comprising a non-transitory computer readable medium having a computer readable program embodied therein, wherein the computer readable program, when executed on a computing device, causes the computing device to:

receive a feature set (F) of a plurality of features associated with non-stationary audio signals;

receive a training set comprising a plurality of non-stationary clean audio signals (C) and non-stationary noisy audio signals (N);

generate a unique and distinctive feature set (UF) based on the training set and the feature set (F);

dynamically generate an unbiased threshold of unique feature attribute value (UFAV) and polarity (P) associated with each of the unique and distinctive features of the unique and distinctive feature set (UF);

identify a test signal as non-stationary noisy test signal or non-stationary clean test signal by statistical isolation based on (i) a unique feature attribute value (UFAV) and the polarity (P) associated with the test signal for each of the unique and distinctive features of the test signal and (ii) the dynamically generated unbiased threshold of the unique feature attribute value (UFAV) and the polarity (P) associated with each of the unique and distinctive features of the unique and distinctive feature set (UF); and

classify the non-stationary noisy test signal further as one of lightly noisy test signal and highly noisy test signal based on one or more pre-defined

conditions when the test signal is identified as the non-stationary noisy test signal.