CLAIMS

1. A map error detection system, comprising:

a map error position candidate calculation unit configured to perform clustering based on the number of pieces of positional information not corresponding to route information included in map information among time-series positional information of a moving object included in a range of a predetermined area using an aggregation of the positional information as a target, to determine a point at which a density of distribution of the positional information is maximized, and to calculate the determined point as a map error candidate position which is a candidate for route information not included in the map information;

wherein the positional information not corresponding to the route information includes positional information included in moving route information when moving route information calculated by connecting the time-series positional information in an order of time is compared with the route information and thus it is determined that the moving route information is different from the route information and positional information included in the moving route information when a moving direction indicated by the moving route information is different from a moving direction associated with the route information, and

in the clustering, the map error position candidate calculation unit calculates a plurality of clusters including part of the aggregation of the positional information not corresponding to the route information in the range of the predetermined area so that the clusters include different parts of the aggregation of the positional information, selects the cluster including the largest number of pieces of positional information among the plurality of calculated clusters, and determines a predetermined point in the selected cluster as a point at which a density of distribution of positional information is maximized.

2. The map error detection system according to claim 1, wherein the clustering is MeanShift, in which the map error position candidate calculation unit sets a circle which has one point based on the positional information not corresponding to the route information as a center and has an average length of a linear portion forming a road in the route information as a radius as the range of the predetermined area.

3. The map error detection system according to Claim 1 or 2, further comprising:

a one-way traffic error determination unit configured to determine whether route information of one-way traffic is included in information on a route existing in the vicinity of the map

error candidate position included in the map information.

4. The map error detection system according to any one of Claims 1 to 3, further comprising:

a one-way traffic automatic determination unit configured to specify neighboring route information with an erroneous traffic direction of one-way traffic among one or a plurality of pieces of information on neighboring routes existing in the vicinity of the map error candidate position included in the map information on the basis of the one or a plurality of pieces of information on neighboring routes and the time-series positional information of the moving object.

5. The map error detection system according to Claim 4,

wherein the one-way traffic automatic determination unit reverses the traffic direction of the neighboring route information and, when the reversed traffic direction coincides with a moving direction of a moving object indicated by the times series positional information and a distance between the information on a neighboring route existing closest to a moving route based on the time-series positional information of the moving object and the moving route is within a predetermined threshold value, specifies the information on the neighboring route as the neighboring route information with an erroneous traffic direction of one-way traffic.

6. The map error detection system according to Claim 4 or 5,

wherein the one-way traffic automatic determination unit corrects a traffic direction of neighboring route information whose traffic direction is determined to be erroneous.

7. A map error detection system, comprising:

a moving route calculation unit configured to calculate moving route information of a moving object by acquiring time-series positional information of the moving object and connecting the time-series positional information in an order of time;

a route information specification unit configured to compare the calculated moving route information with map information and to specify route information corresponding to the calculated moving route information among route information included in the map information; and

a map error position candidate calculation unit configured to perform clustering based on the number of pieces of positional information included in a range of a predetermined area

using an aggregation of time-series positional information of the moving object in which route information is unable to be specified as a target when the route information is unable to be specified, to determine a point at which a density of distribution of positional information is maximized, and to calculate the determined point as a position which is a candidate for route information not included in the map information,

wherein the positional information in which the route information is unable to be specified includes positional information included in the moving route information when the moving route information is compared with the route information and thus it is determined that the moving route information is different from the route information and positional information included in the moving route information when a moving direction indicated by the moving route information is different from a moving direction associated with the route information, and

in the clustering, the map error position candidate calculation unit calculates a plurality of clusters including part of the aggregation of the position information in which the route information is unable to be specified in the range of the predetermined area so that the clusters include different parts of the aggregation of the positional information, selects the cluster including the largest number of pieces of positional information among the plurality of calculated clusters, and determines a predetermined point in the selected cluster as a point at which the density of distribution of the positional information is maximized.

8. A map error detection method, comprising:

a candidate position calculation step of performing clustering based on the number of pieces of positional information not corresponding to route information included in map information among time-series positional information of a moving object included in a range of a predetermined area using an aggregation of the positional information as a target, to determine a point at which a density of distribution of positional information is maximized, and to calculate the determined point as a map error candidate position which is a candidate for route information not included in the map information;

wherein the positional information not corresponding to the route information includes positional information included in moving route information when moving route information calculated by connecting the time-series positional information in an order of time is compared with the route information and thus it is determined that the moving route information is different from the route information and positional information included in the

moving route information when a moving direction indicated by the moving route information is different from a moving direction associated with the route information, and

in the clustering, the candidate position calculation step includes calculating a plurality of clusters including part of the aggregation of the positional information not corresponding to the route information in the range of the predetermined area so that the clusters include different parts of the aggregation of the positional information, selects the cluster including the largest number of pieces of positional information among the plurality of calculated clusters, and determines a predetermined point in the selected cluster as a point at which a density of distribution of positional information is maximized.

9. A program which causes a computer of a map error detection system to function as a candidate position calculation means for performing clustering based on the number of pieces of positional information not corresponding to route information included in map information among time-series positional information of a moving object included in a range of a predetermined area using an aggregation of the positional information as a target, to determine a point at which a density of distribution of positional information is maximized, and to calculate the determined point as a map error candidate position which is a candidate for route information not included in the map information;

wherein the positional information not corresponding to the route information includes positional information included in moving route information when moving route information calculated by connecting the time-series positional information in an order of time is compared with the route information and thus it is determined that the moving route information is different from the route information and positional information included in the moving route information when a moving direction indicated by the moving route information is different from a moving direction associated with the route information, and

in the clustering, the candidate position calculation means calculates a plurality of clusters including part of the aggregation of the positional information not corresponding to the route information in the range of the predetermined area so that the clusters include different parts of the aggregation of the positional information, selects the cluster including the largest number of pieces of positional information among the plurality of calculated clusters, and determines a predetermined point in the selected cluster as a point at which a density of distribution of positional information is maximized.