CLAIMS

[Claim 1] An autonomous vehicle, comprising:

a road surface image obtaining device that is located on a bottom surface of a vehicle body and is configured to obtain a road surface image, the road surface image being an image of a road surface below the vehicle body;

a memory unit that stores map data in which positional coordinates and an orientation of the vehicle body are associated with each other;

an estimating unit that is configured to estimate a self-location by comparing feature points extracted from traveling data and feature points extracted from the map data, the traveling data being the road surface image obtained by the road surface image obtaining device, and the map data being a map image; and

a determining unit that is configured to execute a reliability determining process of determining a reliability of the self-location estimated by the estimating unit, wherein

the reliability determining process includes:

a process of determining whether the estimating unit is in a state capable of estimating the self-location;

a process of determining, in a case in which the self-location can be estimated, whether a number of matches between the feature points extracted from the map data and the feature points extracted from the traveling data when the estimating unit estimates the self-location reaches a predetermined threshold,

a process of determining whether a relative distance between the map image and the road surface image when the estimating unit performs matching is less than a predetermined threshold for the relative distance; and

one or more subsequent determination processes based on the determination

of the relative distance, the one or more subsequent determination processes including one or more comparisons with thresholds different from the predetermined threshold for the relative distance for determining the reliability of the self-location,

wherein the determining unit is configured to determine the reliability of the self-location estimated by the estimating unit based on the results of each of the processes included in the reliability determining process.

[Claim 2] The autonomous vehicle according to claim 1, wherein

the reliability determining process further includes:

a process of determining whether a distribution of the feature points extracted from the map data is uneven; and

a process of determining whether a distribution of the feature points extracted from the traveling data is uneven.

[Claim 3] The autonomous vehicle according to claim 1 or 2, wherein, when the relative distance is determined to be less than the predetermined threshold, a first reliability determination process is performed, and when the relative distance is determined not to be less than the predetermined threshold, a second reliability determination process different from the first reliability determination process is performed.

[Claim 4] The autonomous vehicle according to claim 3, wherein the reliability determining process further includes a process of determining, in a case in which the relative distance between the map image and the road surface image is greater than or equal to the predetermined threshold, whether a relative distance between the self-location estimated by

the estimating unit and a self-location based on vehicle odometry information is less than a predetermined threshold.

[Claim 5] The autonomous vehicle according to any one of claims 1 to 4, wherein the reliability determining process further includes a process of determining whether an elapsed time is shorter than a predetermined threshold, the elapsed time being a difference between a previous point in time at which the estimating unit performed matching and a current point in time at which the estimating unit performed the matching.

[Claim 6] The autonomous vehicle according to any one of claims 1 to 5, wherein the reliability determining process further includes a process of determining whether the map image in which matching is established when the estimating unit estimates the self-location is a map image having a priority lower than a predetermined threshold among map images to be subjected to matching.

[Claim 7] The autonomous vehicle according to any one of claims 1 to 6, wherein the reliability determining process assigns a reliability level from among a plurality of reliability levels ranging from a minimum reliability to a maximum reliability based on the results of each of the processes included in the reliability determining process, including the one or more subsequent determination processes and the one or more comparisons with thresholds different from the predetermined threshold for the relative distance.