CLAIMS

1. An information providing apparatus for a vehicle, comprising:

a traffic information database in which traffic information data are recorded; and

a data processing device configured to process the traffic information data to provide a driver of an assisted vehicle with a notification,

wherein the data processing device is configured to execute:

an event detection process that detects, based on the traffic information data, an impediment event that potentially impedes vehicle running;

an event extraction process that extracts the impediment event potentially encountered by the assisted vehicle;

a determination value calculation process that calculates a notification necessity level for the impediment event based on comparing a frequency associated with the impediment event and a frequency threshold; and

a notification process that provides the driver of the assisted vehicle with the notification regarding the impediment event potentially encountered by the assisted vehicle only when the notification necessity level is greater than a notification necessity level threshold.

wherein the determination value calculation process includes an unexpected event determination process that calculates the notification necessity level or the notification necessity level threshold

such that the notification regarding the impediment event whose frequency of occurrence is lower is more likely to be provided than an impediment event whose frequency of occurrence is more likely to occur.

2. The information providing apparatus for a vehicle according to claim 1,

wherein the data processing device is further configured to execute a traffic information recording process that records, in the traffic information database, the traffic information data received from an information providing vehicle.

3. The information providing apparatus for a vehicle according to claim 2,

wherein the traffic information data includes:

positional information of the information providing vehicle; and

vehicle behavior information of the information providing vehicle.

4. The information providing apparatus for a vehicle according to claim 2 or 3,

wherein the traffic information data includes:

positional information of the information providing vehicle; and

a result of detection by a surrounding monitoring sensor that is installed in the information providing vehicle for monitoring a surrounding situation.

5. The information providing apparatus for a vehicle according to claim 1,

wherein the frequency of occurrence becomes lower as a period of occurrence of the impediment event within a defined period of time becomes shorter.

6. The information providing apparatus for a vehicle according to claim 1,

wherein the frequency of occurrence becomes lower as an interval of occurrence of the impediment event becomes longer.

7. The information providing apparatus for a vehicle according to any one of claims 1 to 6,

wherein the determination value calculation process includes an unexpected event determination process that calculates the notification necessity level or the notification necessity level threshold such that the notification regarding the impediment event whose probability of occurrence is lower is more likely to be provided.

8. The information providing apparatus for a vehicle according to claim 7,

wherein there is a population of on-road fixed objects,

a state of each of the on-road fixed objects is switchable between a plurality of states,

the impediment event is caused when the state is switched to one of the plurality of states, and

the probability of occurrence is defined for each of the on-road fixed objects as probability of occurrence of the one state causing the impediment event.

9. The information providing apparatus for a vehicle according to claim 8, further comprising a driver information database in which a movement history of the driver of the assisted vehicle is recorded,

wherein the determination value calculation process further includes a visit frequency determination process that calculates, based on the movement history, a frequency of visit by the driver to a place where the assisted vehicle is running, and

the unexpected event determination process calculates the notification necessity level or the notification necessity level threshold such that the notification regarding the impediment event related to an on-road fixed object is less likely to be provided as the frequency of visit by the driver to an installation site of the on-road fixed object is lower.

10. The information providing apparatus for a vehicle according to any one of claims 1 to 6, further comprising a driver information database in which a movement history of the driver of the assisted vehicle is recorded,

wherein the determination value calculation process further includes a visit frequency determination process that calculates, based on the movement history, a frequency of visit by the driver to a place where the assisted vehicle is running, and

the determination value calculation process calculates the notification necessity level or the notification necessity level threshold such that the notification regarding the impediment event is more likely to be provided as the frequency of visit by the driver to a location of occurrence of the impediment event is lower.

11. The information providing apparatus for a vehicle according to claim 10,

wherein the visit frequency determination process calculates the frequency of visit by the driver during current hours, and

the determination value calculation process calculates the notification necessity level or the notification necessity level threshold based on the frequency of visit by the driver during the current hours.

12. The information providing apparatus for a vehicle according to any one of claims 1 to 11, further comprising a notification history database in which a history of the notification regarding the impediment event to the assisted vehicle is recorded,

wherein the notification process includes a process that makes an interval of the notification regarding a same impediment event to a same assisted vehicle equal to or more than a certain period of time.

13. The information providing apparatus for a vehicle according to any one of claims 1 to 12, further comprising a driving skill database in which information regarding a driving skill of the driver of the assisted vehicle is recorded,

wherein the notification process includes a process that makes the notification less likely to be provided to the driver whose driving skill is higher.

14. The information providing apparatus for a vehicle according to any one of claims 1 to 13, further comprising a setting database in which settings regarding the notification set by the driver of the assisted vehicle are recorded,

wherein the notification process includes a process that reflects the settings in possibility of providing the driver with the notification.

15. The information providing apparatus for a vehicle according to any one of claims 1 to 14,

wherein the data processing device is further configured to execute a certainty level calculation process that calculates, based on the traffic information data, a certainty level of the impediment event, and

the notification process provides the driver of the assisted vehicle with the notification regarding the impediment event having the certainty level equal to or higher than a notification threshold.

16. The information providing apparatus for a vehicle according to any one of claims 1 to 15,

wherein the determination value calculation process includes a stress event determination process that calculates the notification necessity level or the threshold such

that the notification regarding the impediment event giving greater stress to the driver is more likely to be provided.

17. The information providing apparatus for a vehicle according to claim 16, further comprising a driver information database in which a movement history of the driver of the assisted vehicle is recorded,

wherein the stress event determination process includes:

a process of calculating, based on the movement history, a frequency of encounter by the driver with the impediment event; and

a process of calculating the notification necessity level or the notification necessity level threshold such that the notification regarding the impediment event with a higher frequency of encounter is less likely to be provided.