

1. A vehicle data processing system for processing vehicle data including information of a vehicle running on a road, the vehicle data processing system

5 comprising:

an imaging device configured to continuously capture an image of a road;

a wireless device having a communication area overlapping an imaging area of the imaging device; and

10 a vehicle data processing device configured to process vehicle data I including information of a vehicle captured by the imaging device and vehicle data II including information of vehicles received by the wireless device from vehicle-mounted devices of the vehicles,

wherein the vehicle data processing device includes a data associating unit configured to associate (i) vehicle data II including information of a vehicle which has a possibility to be the same as information of a target vehicle of the vehicle data I among
15 the vehicle data II with (ii) the vehicle data I.

2. The vehicle data processing system according to claim 1,

wherein the vehicle data processing device further includes:

20 a vehicle number search unit configured to retrieve vehicle data II including information of a vehicle number which is the same as information of a vehicle number of the vehicle included in the vehicle data I among the vehicle data II, and

wherein the data associating unit properly associates the vehicle data II retrieved by the vehicle number search unit with the vehicle data I.

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3. The vehicle data processing system according to claim 2,
wherein the vehicle data processing device further includes:

an optical character recognition availability determining unit configured to
determine whether a character string of a vehicle number, which is a result of optical
5 character recognition on a number plate of the vehicle captured by the imaging device
and is represented by the information of the vehicle number of the vehicle included in the
vehicle data I, is recognized as characters or not; and

wherein, if the optical character recognition availability determining unit
determines that the entire character string of the vehicle number represented by the
10 information of the vehicle number of the vehicle included in the vehicle data I is
recognized as characters, the vehicle number search unit retrieves vehicle data II
including information of a vehicle number which is the same as the information of the
vehicle number of the vehicle included in the vehicle data I among the vehicle data II.

- 15 4. The vehicle data processing system according to claim 3,
wherein the vehicle data processing device further includes:

a vehicle type classification search unit configured to retrieve vehicle data II
including information of vehicle type classification different from information of vehicle
type classification of the vehicle included in the vehicle data I among the vehicle data II;

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a running limitation search unit configured to retrieve vehicle data II including
information of a value which is not subject to running limitation of the road among the
vehicle data II, and

wherein, if a result of retrieval performed by the vehicle number search unit
25 represents that the vehicle data II including the information of the vehicle number which

is the same as the information of the vehicle number of the vehicle included in the vehicle data I is not found, the data associating unit provisionally associates the vehicle data II retrieved by the vehicle type classification search unit and the vehicle data II retrieved by the running limitation search unit with the vehicle data I.

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5. The vehicle data processing system according to claim 4, wherein, if results of retrieval performed by the vehicle type classification search unit and the running limitation search unit represent that the vehicle data II including the information of the vehicle type classification different from the information of the vehicle type classification of the vehicle included in the vehicle data I and the information of the value which is not subject to the running limitation of the road is not found, the data associating unit ends association of the vehicle data II with the vehicle data I without associating the vehicle data II with the vehicle data I by determining that there is a suspicion of illegality in which a vehicle-mounted device is not mounted on the vehicle on the basis that there is no vehicle data II to be associated with the vehicle data I.

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6. The vehicle data processing system according to claim 4 or 5,
wherein the vehicle data processing device further includes:
an overlapping range search unit configured to retrieve vehicle data II including information of the wireless device having the communication area overlapping the imaging area of the imaging device represented by information of the imaging device capturing the vehicle included in the vehicle data I among the vehicle data II,
wherein the vehicle type classification search unit retrieves the vehicle data II including the information of the vehicle type classification different from the information of the vehicle type classification of the vehicle included in the vehicle data I among the

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vehicle data II retrieved by the overlapping range search unit, and

wherein the running limitation search unit retrieves the vehicle data II including the information of the value which is not subject to the running limitation of the road among the vehicle data II retrieved by the overlapping range search unit.

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7. The vehicle data processing system according to claim 6, wherein, if a result of retrieval performed by the overlapping range search unit represents that the vehicle data II including the information of the wireless device having the communication area overlapping the imaging area of the imaging device represented by the information of the imaging device capturing the vehicle included in the vehicle data I is not found, the data associating unit ends association of the vehicle data II with the vehicle data I without associating the vehicle data II with the vehicle data I by determining that there is no vehicle data II to be associated with the vehicle data I.

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8. The vehicle data processing system according to claim 7,
wherein the vehicle data processing device further includes:

a character completing unit configured to complete partial characters which are not recognized as characters in the character string of the vehicle number represented by the information of the vehicle number of the vehicle included in the vehicle data I; and

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wherein, if the optical character recognition availability determining unit determines that part of the character string of the vehicle number represented by the information of the vehicle number of the vehicle included in the vehicle data I is not recognized as the characters, the vehicle number search unit retrieves vehicle data II including information of a vehicle number which is the same as the information of the

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vehicle number of the vehicle, where the characters have been completed by the

character completing unit, included in the vehicle data I among the vehicle data II.

9. The vehicle data processing system according to claim 8,
wherein the vehicle data processing device further includes:

5 a control target search unit configured to retrieve vehicle data II including
information of a vehicle of a control target among the vehicle data II, and

wherein, if the result of the retrieval performed by the vehicle number search
unit represents that the vehicle data II including the information of the vehicle number
which is the same as the information of the vehicle number of the vehicle, where the
10 characters have been completed by the character completing unit, included in the vehicle
data I is not found, the data associating unit provisionally associates the vehicle data II
retrieved by the control target search unit with the vehicle data I.

10. The vehicle data processing system according to claim 9, wherein the control
15 target search unit retrieves the vehicle data II including the information of the vehicle of
the control target among the vehicle data II retrieved by the overlapping range search
unit.

11. The vehicle data processing system according to claim 9 or 10, wherein, if a
20 result of retrieval performed by the control target search unit represents that the vehicle
data II including the information of the vehicle of the control target is not found, the data
associating unit provisionally associates the vehicle data II retrieved by the vehicle type
classification search unit and the vehicle data II retrieved by the running limitation search
unit with the vehicle data I.

12. The vehicle data processing system according to any one of claims 9 to 11,
wherein, if a result of retrieval performed by the control target search unit represents that
the vehicle data II including the information of the vehicle of the control target is not
found and the results of the retrieval performed by the vehicle type classification search
5 unit and the running limitation search unit represent that the vehicle data II including the
information of the vehicle type classification different from the information of the
vehicle type classification of the vehicle included in the vehicle data I and the
information of the value which is not subject to the running limitation of the road is not
found, the data associating unit ends the association of the vehicle data II with the vehicle
10 data I without associating the vehicle data II with the vehicle data I by determining that a
possibility of illegality of the target vehicle of the vehicle data I is low.

13. The vehicle data processing system according to any one of claims 4 to 7,
wherein the vehicle data processing device further includes:
15 a control target determining unit configured to determine whether the vehicle is
a control target based on the information of the vehicle number of the vehicle included in
the vehicle data I, and

wherein, if the vehicle data II retrieved by the running limitation search unit
among the vehicle data II retrieved by the vehicle type classification search unit is
20 provisionally associated with the vehicle data I or if association of the vehicle data II
with the vehicle data I ends without associating the vehicle data II with the vehicle data I
by determining that there is no vehicle data II to be associated with the vehicle data I, the
data associating unit associates information representing a result of determination made
by the control target determining unit with the vehicle data I.

14. The vehicle data processing system according to any one of claims 1 to 13,
wherein, upon properly associating the vehicle data II with the vehicle data I, if the
vehicle data II is provisionally associated with other vehicle data I, the data associating
unit cancels provisional association of the vehicle data II with the other vehicle data I and
5 properly associates the vehicle data II with the vehicle data I.

15. The vehicle data processing system according to any one of claims 1 to 14,
wherein the vehicle data processing device further includes:
a vehicle data transmitting unit configured to transmit vehicle data including
10 information of a vehicle included in at least one of the vehicle data I and the vehicle data
II to an external device.

16. The vehicle data processing system according to claim 15, wherein, if the data
associating unit has properly associated the vehicle data II with the vehicle data I, the
15 vehicle data transmitting unit transmits vehicle data including the information of the
vehicle included in the vehicle data I and the vehicle data II to the external device.

17. The vehicle data processing system according to claim 15 or 16, wherein, if the
data associating unit has ended association of the vehicle data II with the vehicle data I
20 without associating the vehicle data II with the vehicle data I by determining that there is
no vehicle data II to be associated with the vehicle data I, the vehicle data transmitting
unit transmits vehicle data including the information of the vehicle included in the
vehicle data I to the external device.

25 18. The vehicle data processing system according to any one of claims 15 to 17,

wherein, if the imaging device having the imaging area overlapping the communication area of the wireless device receiving the vehicle data II captures a predetermined number of vehicles after a reception time of the vehicle data II if the data associating unit has provisionally associated the vehicle data II with the vehicle data I, the vehicle data transmitting unit transmits vehicle data including the information of the vehicle included in the vehicle data I and the vehicle data II and an image captured by the imaging device represented by information of an image included in the vehicle data I to the external device.

19. The vehicle data processing system according to any one of claims 15 to 18, wherein, if a predetermined time has elapsed from a reception time of the vehicle data II if the data associating unit has provisionally associated the vehicle data II with the vehicle data I, the vehicle data transmitting unit transmits vehicle data including the information of the vehicle included in the vehicle data I and the vehicle data II and an image captured by the imaging device represented by information of an image included in the vehicle data I to the external device.

20. A vehicle data processing method of processing vehicle data I including information of a vehicle captured by an imaging device continuously capturing an image of a road and vehicle data II including information of vehicles received by a wireless device having a communication area overlapping an imaging area of the imaging device from vehicle-mounted devices of the vehicles, the vehicle data processing method comprising:

a data associating step of associating (i) vehicle data II including information of a vehicle which has a possibility to be the same as information of a target vehicle of the

vehicle data I among the vehicle data II with (ii) the vehicle data I.

21. A vehicle data processing device for processing vehicle data I including information of a vehicle captured by an imaging device continuously capturing an image of a road and vehicle data II including information of vehicles received by a wireless device having a communication area overlapping an imaging area of the imaging device from vehicle-mounted devices of the vehicles, the vehicle data processing device comprising:

a data associating unit configured to associate (i) vehicle data II including information of a vehicle which has a possibility to be the same as information of a target vehicle of the vehicle data I among the vehicle data II with (ii) the vehicle data I.

22. A program for causing a computer to function as a vehicle data processing device for processing vehicle data I including information of a vehicle captured by an imaging device continuously capturing an image of a road and vehicle data II including information of vehicles received by a wireless device having a communication area overlapping an imaging area of the imaging device from vehicle-mounted devices of the vehicles,

wherein the program causes the computer to function as a data associating unit configured to associate (i) vehicle data II including information of a vehicle which has a possibility to be the same as information of a target vehicle of the vehicle data I among the vehicle data II with (ii) the vehicle data I.

23. A recording medium recording a program for causing a computer to function as a vehicle data processing device for processing vehicle data I including information of a

vehicle captured by an imaging device continuously capturing an image of a road and vehicle data II including information of vehicles received by a wireless device having a communication area overlapping an imaging area of the imaging device from vehicle-mounted devices of the vehicles,

- 5 wherein the program causes the computer to function as a data associating unit configured to associate (i) vehicle data II including information of a vehicle which has a possibility to be the same as information of a target vehicle of the vehicle data I among the vehicle data II with (ii) the vehicle data I.

Claims

1. A vehicle data processing system for processing vehicle data including information of a vehicle running on a road, the vehicle data processing system comprising:
 - an imaging device configured to continuously capture an image of a road;
 - a wireless device having a communication area overlapping an imaging area of the imaging device; and
 - a vehicle data processing device configured to process vehicle data I including information of a vehicle captured by the imaging device and vehicle data II including information of vehicles received by the wireless device from vehicle-mounted devices of the vehicles,
 - wherein the vehicle data processing device includes a data associating unit configured to associate (i) vehicle data II including information of a vehicle which has a possibility to be the same as information of a target vehicle of the vehicle data I among the vehicle data II with (ii) the vehicle data I, and
 - wherein, upon properly associating the vehicle data II with the vehicle data I, if the vehicle data II is provisionally associated with other vehicle data I, the data associating unit cancels provisional association of the vehicle data II with the other vehicle data I and properly associates the vehicle data II with the vehicle data I.
2. The vehicle data processing system according to claim 1,
 - wherein the vehicle data processing device further includes:
 - a vehicle number search unit configured to retrieve vehicle data II including information of a vehicle number which is the same as information of a vehicle number of the vehicle included in the vehicle data I among the vehicle data II, and
 - wherein the data associating unit properly associates the vehicle data II retrieved by the vehicle number search unit with the vehicle data I.
3. The vehicle data processing system according to claim 2,
 - wherein the vehicle data processing device further includes:

an optical character recognition availability determining unit configured to determine whether a character string of a vehicle number, which is a result of optical character recognition on a number plate of the vehicle captured by the imaging device and is represented by the information of the vehicle number of the vehicle included in the vehicle data I, is recognized as characters or not; and

wherein, if the optical character recognition availability determining unit determines that the entire character string of the vehicle number represented by the information of the vehicle number of the vehicle included in the vehicle data I is recognized as characters, the vehicle number search unit retrieves vehicle data II including information of a vehicle number which is the same as the information of the vehicle number of the vehicle included in the vehicle data I among the vehicle data II.

4. The vehicle data processing system according to claim 3,

wherein the vehicle data processing device further includes:

a vehicle type classification search unit configured to retrieve vehicle data II including information of vehicle type classification different from information of vehicle type classification of the vehicle included in the vehicle data I among the vehicle data II; and

a running limitation search unit configured to retrieve vehicle data II including information of a value which is not subject to running limitation of the road among the vehicle data II, and

wherein, if a result of retrieval performed by the vehicle number search unit represents that the vehicle data II including the information of the vehicle number which is the same as the information of the vehicle number of the vehicle included in the vehicle data I is not found, the data associating unit provisionally associates the vehicle data II retrieved by the vehicle type classification search unit and the vehicle data II retrieved by the running limitation search unit with the vehicle data I.

5. The vehicle data processing system according to claim 4, wherein, if results of retrieval performed by the vehicle type classification search unit and the running limitation search unit represent that the vehicle data II including the information of the

vehicle type classification different from the information of the vehicle type classification of the vehicle included in the vehicle data I and the information of the value which is not subject to the running limitation of the road is not found, the data associating unit ends association of the vehicle data II with the vehicle data I without associating the vehicle data II with the vehicle data I by determining that there is a suspicion of illegality in which a vehicle-mounted device is not mounted on the vehicle on the basis that there is no vehicle data II to be associated with the vehicle data I.

6. The vehicle data processing system according to claim 4 or 5,
 wherein the vehicle data processing device further includes:
 an overlapping range search unit configured to retrieve vehicle data II
 including information of the wireless device having the communication area
 overlapping the imaging area of the imaging device represented by information of the
 imaging device capturing the vehicle included in the vehicle data I among the vehicle
 data II,
 wherein the vehicle type classification search unit retrieves the vehicle data II
 including the information of the vehicle type classification different from the
 information of the vehicle type classification of the vehicle included in the vehicle data I
 among the vehicle data II retrieved by the overlapping range search unit, and
 wherein the running limitation search unit retrieves the vehicle data II
 including the information of the value which is not subject to the running limitation of
 the road among the vehicle data II retrieved by the overlapping range search unit.

7. The vehicle data processing system according to claim 6, wherein, if a result
 of retrieval performed by the overlapping range search unit represents that the vehicle
 data II including the information of the wireless device having the communication area
 overlapping the imaging area of the imaging device represented by the information of
 the imaging device capturing the vehicle included in the vehicle data I is not found, the
 data associating unit ends association of the vehicle data II with the vehicle data I
 without associating the vehicle data II with the vehicle data I by determining that there
 is no vehicle data II to be associated with the vehicle data I.

8. The vehicle data processing system according to claim 7,
wherein the vehicle data processing device further includes:
a character completing unit configured to complete partial characters which are not recognized as characters in the character string of the vehicle number represented by the information of the vehicle number of the vehicle included in the vehicle data I; and
wherein, if the optical character recognition availability determining unit determines that part of the character string of the vehicle number represented by the information of the vehicle number of the vehicle included in the vehicle data I is not recognized as the characters, the vehicle number search unit retrieves vehicle data II including information of a vehicle number which is the same as the information of the vehicle number of the vehicle, where the characters have been completed by the character completing unit, included in the vehicle data I among the vehicle data II.
9. The vehicle data processing system according to claim 8,
wherein the vehicle data processing device further includes:
a control target search unit configured to retrieve vehicle data II including information of a vehicle of a control target among the vehicle data II, and
wherein, if the result of the retrieval performed by the vehicle number search unit represents that the vehicle data II including the information of the vehicle number which is the same as the information of the vehicle number of the vehicle, where the characters have been completed by the character completing unit, included in the vehicle data I is not found, the data associating unit provisionally associates the vehicle data II retrieved by the control target search unit with the vehicle data I.
10. The vehicle data processing system according to claim 9, wherein the control target search unit retrieves the vehicle data II including the information of the vehicle of the control target among the vehicle data II retrieved by the overlapping range search unit.
11. The vehicle data processing system according to claim 9 or 10, wherein, if a

result of retrieval performed by the control target search unit represents that the vehicle data II including the information of the vehicle of the control target is not found, the data associating unit provisionally associates the vehicle data II retrieved by the vehicle type classification search unit and the vehicle data II retrieved by the running limitation search unit with the vehicle data I.

12. The vehicle data processing system according to any one of claims 9 to 11, wherein, if a result of retrieval performed by the control target search unit represents that the vehicle data II including the information of the vehicle of the control target is not found and the results of the retrieval performed by the vehicle type classification search unit and the running limitation search unit represent that the vehicle data II including the information of the vehicle type classification different from the information of the vehicle type classification of the vehicle included in the vehicle data I and the information of the value which is not subject to the running limitation of the road is not found, the data associating unit ends the association of the vehicle data II with the vehicle data I without associating the vehicle data II with the vehicle data I by determining that a possibility of illegality of the target vehicle of the vehicle data I is low.

13. The vehicle data processing system according to any one of claims 4 to 7, wherein the vehicle data processing device further includes:
a control target determining unit configured to determine whether the vehicle is a control target based on the information of the vehicle number of the vehicle included in the vehicle data I, and

wherein, if the vehicle data II retrieved by the running limitation search unit among the vehicle data II retrieved by the vehicle type classification search unit is provisionally associated with the vehicle data I or if association of the vehicle data II with the vehicle data I ends without associating the vehicle data II with the vehicle data I by determining that there is no vehicle data II to be associated with the vehicle data I, the data associating unit associates information representing a result of determination made by the control target determining unit with the vehicle data I.

14. The vehicle data processing system according to any one of claims 1 to 13, wherein the vehicle data processing device further includes:

a vehicle data transmitting unit configured to transmit vehicle data including information of a vehicle included in at least one of the vehicle data I and the vehicle data II to an external device.

15. The vehicle data processing system according to claim 14, wherein, if the data associating unit has properly associated the vehicle data II with the vehicle data I, the vehicle data transmitting unit transmits vehicle data including the information of the vehicle included in the vehicle data I and the vehicle data II to the external device.

16. The vehicle data processing system according to claim 14 or 15, wherein, if the data associating unit has ended association of the vehicle data II with the vehicle data I without associating the vehicle data II with the vehicle data I by determining that there is no vehicle data II to be associated with the vehicle data I, the vehicle data transmitting unit transmits vehicle data including the information of the vehicle included in the vehicle data I to the external device.

17. The vehicle data processing system according to any one of claims 14 to 16, wherein, if the imaging device having the imaging area overlapping the communication area of the wireless device receiving the vehicle data II captures a predetermined number of vehicles after a reception time of the vehicle data II if the data associating unit has provisionally associated the vehicle data II with the vehicle data I, the vehicle data transmitting unit transmits vehicle data including the information of the vehicle included in the vehicle data I and the vehicle data II and an image captured by the imaging device represented by information of an image included in the vehicle data I to the external device.

18. The vehicle data processing system according to any one of claims 14 to 17, wherein, if a predetermined time has elapsed from a reception time of the vehicle data II

if the data associating unit has provisionally associated the vehicle data II with the vehicle data I, the vehicle data transmitting unit transmits vehicle data including the information of the vehicle included in the vehicle data I and the vehicle data II and an image captured by the imaging device represented by information of an image included in the vehicle data I to the external device.

19. A vehicle data processing method of processing vehicle data I including information of a vehicle captured by an imaging device continuously capturing an image of a road and vehicle data II including information of vehicles received by a wireless device having a communication area overlapping an imaging area of the imaging device from vehicle-mounted devices of the vehicles, the vehicle data processing method comprising:

a data associating step of associating (i) vehicle data II including information of a vehicle which has a possibility to be the same as information of a target vehicle of the vehicle data I among the vehicle data II with (ii) the vehicle data I, and

wherein, upon properly associating the vehicle data II with the vehicle data I, if the vehicle data II is provisionally associated with other vehicle data I, the data associating step of cancelling provisional association of the vehicle data II with the other vehicle data I and of properly associating the vehicle data II with the vehicle data I.

20. A vehicle data processing device for processing vehicle data I including information of a vehicle captured by an imaging device continuously capturing an image of a road and vehicle data II including information of vehicles received by a wireless device having a communication area overlapping an imaging area of the imaging device from vehicle-mounted devices of the vehicles, the vehicle data processing device comprising:

a data associating unit configured to associate (i) vehicle data II including information of a vehicle which has a possibility to be the same as information of a target vehicle of the vehicle data I among the vehicle data II with (ii) the vehicle data I, and

wherein, upon properly associating the vehicle data II with the vehicle data I, if

the vehicle data II is provisionally associated with other vehicle data I, the data associating unit cancels provisional association of the vehicle data II with the other vehicle data I and properly associates the vehicle data II with the vehicle data I.

21. A program for causing a computer to function as a vehicle data processing device for processing vehicle data I including information of a vehicle captured by an imaging device continuously capturing an image of a road and vehicle data II including information of vehicles received by a wireless device having a communication area overlapping an imaging area of the imaging device from vehicle-mounted devices of the vehicles,

wherein the program causes the computer to function as a data associating unit configured to associate (i) vehicle data II including information of a vehicle which has a possibility to be the same as information of a target vehicle of the vehicle data I among the vehicle data II with (ii) the vehicle data I, and

wherein, upon properly associating the vehicle data II with the vehicle data I, if the vehicle data II is provisionally associated with other vehicle data I, the data associating unit cancels provisional association of the vehicle data II with the other vehicle data I and properly associates the vehicle data II with the vehicle data I.

22. A recording medium recording a program for causing a computer to function as a vehicle data processing device for processing vehicle data I including information of a vehicle captured by an imaging device continuously capturing an image of a road and vehicle data II including information of vehicles received by a wireless device having a communication area overlapping an imaging area of the imaging device from vehicle-mounted devices of the vehicles,

wherein the program causes the computer to function as a data associating unit configured to associate (i) vehicle data II including information of a vehicle which has a possibility to be the same as information of a target vehicle of the vehicle data I among the vehicle data II with (ii) the vehicle data I, and

wherein, upon properly associating the vehicle data II with the vehicle data I, if the vehicle data II is provisionally associated with other vehicle data I, the data

associating unit cancels provisional association of the vehicle data II with the other vehicle data I and properly associates the vehicle data II with the vehicle data I.