

CLAIMS

[Claim 1]

A toll computation device which computes a toll to be applied to a road network area including a plurality of roads, the toll computation device comprising:

5 a toll computation unit configured to compute the toll to be applied to the road network area based on:

an aggregate QK relationship representing a correlation between an aggregate traffic flow rate (Q), which is a sum of the number of vehicles per unit distance per unit time calculated by regarding each road as a unit for the roads to be evaluated included in the road network area, and an aggregate traffic density (K), which is the total
10 number of vehicles within the road network area; and

an estimation value of the aggregate traffic density (K) at a predetermined time.

[Claim 2]

15 The toll computation device according to claim 1, further comprising:

an aggregate QK relationship computation unit configured to compute the aggregate QK relationship representing the correlation between the aggregate traffic flow rate (Q), which is the sum of the number of vehicles per unit distance per unit time calculated by regarding each road as a unit for the roads to be evaluated included in the
20 road network area, and the aggregate traffic density (K), which is the total number of vehicles within the road network area,

wherein the toll computation unit computes the toll to be applied to the road network area based on:

the aggregate QK relationship computed by the aggregate QK
25 relationship computation unit; and

the estimation value of the aggregate traffic density (K) at the predetermined time.

[Claim 3]

The toll computation device according to claim 1 or 2, further comprising:

5 an aggregate traffic density (K) estimation unit configured to estimate the aggregate traffic density (K) at the predetermined time based on traffic flow simulation results in the road network area,

wherein the toll computation unit computes the toll to be applied to the road network area based on:

10 the aggregate QK relationship representing the correlation between the aggregate traffic flow rate (Q), which is the sum of the number of vehicles per unit distance per unit time calculated by regarding each road as a unit for the roads to be evaluated included in the road network area, and the aggregate traffic density (K), which is the total number of vehicles within the road network area; and

15 the estimation value of the aggregate traffic density (K) estimated by the aggregate traffic density (K) estimation unit.

[Claim 4]

The toll computation device according to any one of claims 1 to 3, further comprising:

20 a toll data distribution unit configured to distribute data representing the toll to be applied to the road network area computed by the toll computation unit to a user terminal of a user of a vehicle.

[Claim 5]

25 A control method of controlling a toll computation device which computes a toll to be applied to a road network area including a plurality of roads, the control method

comprising:

a toll computation step of computing the toll to be applied to the road network area based on:

an aggregate QK relationship representing a correlation between an aggregate traffic flow rate (Q), which is a sum of the number of vehicles per unit distance per unit time calculated by regarding each road as a unit for the roads to be evaluated included in the road network area, and an aggregate traffic density (K), which is the total number of vehicles within the road network area; and

an estimation value of the aggregate traffic density (K) at a predetermined time.

[Claim 6]

A program for use in a toll computation device which computes a toll to be applied to a road network area including a plurality of roads, the program causing the toll computation device to function as:

a toll computation unit configured to compute the toll to be applied to the road network area based on:

an aggregate QK relationship representing a correlation between an aggregate traffic flow rate (Q), which is a sum of the number of vehicles per unit distance per unit time calculated by regarding each road as a unit for the roads to be evaluated included in the road network area, and an aggregate traffic density (K), which is the total number of vehicles within the road network area; and

an estimation value of the aggregate traffic density (K) at a predetermined time.

CLAIMS

1. A toll computation device which computes a toll to be applied to a road network area including a plurality of roads, the toll computation device comprising:

a toll computation unit configured to compute the toll to be applied to the road network area based on:

an aggregate QK relationship representing a correlation between an aggregate traffic flow rate (Q), which is a sum of the number of vehicles per unit distance per unit time calculated by regarding each road as a unit for the roads to be evaluated included in the road network area, and an aggregate traffic density (K), which is the total number of vehicles within the road network area; and

an estimation value of the aggregate traffic density (K) at a predetermined time, wherein

the toll computation unit specifies: a maximum value of the aggregate traffic flow rate (Q); a value of the aggregate traffic density (K) corresponding to the maximum value of the aggregate traffic flow rate (Q); and a value of the aggregate traffic flow rate (Q) corresponding to the estimation value of the aggregate traffic density (K), and

the toll computation unit computes the toll based on (i) a ratio of the value of the aggregate traffic flow rate (Q) corresponding to the estimation value of the aggregate traffic density (K) to the maximum value of the aggregate traffic flow rate (Q) and (ii) a comparison result obtained by comparing the value of the aggregate traffic density (K) corresponding to the maximum value of the aggregate traffic flow rate (Q) to the estimation value of the aggregate traffic density (K).

2. The toll computation device according to claim 1, further comprising:

an aggregate QK relationship computation unit configured to compute the aggregate QK relationship representing the correlation between the aggregate traffic flow rate (Q), which is the sum of the number of vehicles per unit distance per unit time calculated by regarding each road as a unit for the roads to be evaluated included in the road network area, and the aggregate traffic density (K), which is the total number of vehicles within the road network area,

wherein the toll computation unit computes the toll to be applied to the road network area based on:

the aggregate QK relationship computed by the aggregate QK relationship computation unit; and

the estimation value of the aggregate traffic density (K) at the predetermined time.

3. The toll computation device according to claim 1 or 2, further comprising:

an aggregate traffic density (K) estimation unit configured to estimate the aggregate traffic density (K) at the predetermined time based on traffic flow simulation results in the road network area,

wherein the toll computation unit computes the toll to be applied to the road network area based on:

the aggregate QK relationship representing the correlation between the aggregate traffic flow rate (Q), which is the sum of the number of vehicles per unit distance per unit time calculated by regarding each road as a unit for the roads to be evaluated included in the road network area, and the aggregate traffic density (K), which is the total number of vehicles within the road network area; and

the estimation value of the aggregate traffic density (K) estimated by the aggregate traffic density (K) estimation unit.

4. The toll computation device according to any one of claims 1 to 3, further comprising:
a toll data distribution unit configured to distribute data representing the toll to be applied to the road network area computed by the toll computation unit to a user terminal of a user of a vehicle.

5. A control method of controlling a toll computation device which computes a toll to be applied to a road network area including a plurality of roads, the control method comprising:

a toll computation step of computing the toll to be applied to the road network area based on:

an aggregate QK relationship representing a correlation between an aggregate traffic flow rate (Q), which is a sum of the number of vehicles per unit distance per unit time calculated by regarding each road as a unit for the roads to be evaluated included in the road network area, and an aggregate traffic density (K), which is the total number of vehicles within the road network area; and

an estimation value of the aggregate traffic density (K) at a predetermined time, wherein

the toll computation step further includes:

a step of specifying: a maximum value of the aggregate traffic flow rate (Q); a value of the aggregate traffic density (K) corresponding to the maximum value of the aggregate traffic flow rate (Q); and a value of the aggregate traffic flow rate (Q)

corresponding to the estimation value of the aggregate traffic density (K), and

a step of computing the toll based on (i) a ratio of the value of the aggregate traffic flow rate (Q) corresponding to the estimation value of the aggregate traffic density (K) to the maximum value of the aggregate traffic flow rate (Q) and (ii) a comparison result obtained by comparing the value of the aggregate traffic density (K) corresponding to the maximum value of the aggregate traffic flow rate (Q) to the estimation value of the aggregate traffic density (K).

6. A program for use in a toll computation device which computes a toll to be applied to a road network area including a plurality of roads, the program causing the toll computation device to function as:

a toll computation unit configured to compute the toll to be applied to the road network area based on:

an aggregate QK relationship representing a correlation between an aggregate traffic flow rate (Q), which is a sum of the number of vehicles per unit distance per unit time calculated by regarding each road as a unit for the roads to be evaluated included in the road network area, and an aggregate traffic density (K), which is the total number of vehicles within the road network area; and

an estimation value of the aggregate traffic density (K) at a predetermined time, wherein

the toll computation unit specifies: a maximum value of the aggregate traffic flow rate (Q); a value of the aggregate traffic density (K) corresponding to the maximum value of the aggregate traffic flow rate (Q); and a value of the aggregate traffic flow rate (Q) corresponding to the estimation value of the aggregate traffic density (K), and

the toll computation unit computes the toll based on (i) a ratio of the value of the aggregate traffic flow rate (Q) corresponding to the estimation value of the aggregate traffic density (K) to the maximum value of the aggregate traffic flow rate (Q) and (ii) a comparison result obtained by comparing the value of the aggregate traffic density (K) corresponding to the maximum value of the aggregate traffic flow rate (Q) to the estimation value of the aggregate traffic density (K).