Claims

1. A processing apparatus for traffic management of a network of roads, comprising a processor and a memory, the apparatus being configured, under control of the processor to execute instructions in the memory to:

process data corresponding to the network of roads to identify an incoming road and an outgoing road intersecting at an intersection node of the network, the incoming road being for incoming traffic leading to the intersection node and the outgoing road being for outgoing traffic leading away from the intersection node;

determine, based on the data corresponding to the network, whether there is a bypass road to allow the incoming traffic from the incoming road to bypass the intersection node and flow to the outgoing road via the bypass road; and

if it is determined that there is the bypass road, determine that there is a turn restriction of flow of the incoming traffic to the outgoing road via the intersection node, and generate data indicative of the turn restriction for communicating to road users.

2. The apparatus as claimed in claim 1, further configured to process the data corresponding to the network of roads to identify an entry node for a first segment of the incoming road and an exit node for a second segment of the outgoing road;

wherein, for determining whether there is the bypass road, the apparatus is configured to:

determine, based on the data corresponding to the network, whether there is a connecting road connected to the entry node and the exit node; and

if there is the connecting road, generate data indicative of the connecting road being the bypass road.

3. The apparatus as claimed in claim 1, wherein the data corresponding to the network comprises data indicative of a geometrical layout of the network, and, for

determining whether there is the bypass road, the apparatus is configured to determine whether there is the bypass road based on the data indicative of the geometrical layout of the network.

4. The apparatus as claimed in claim 3, wherein, for determining whether there is the bypass road, the apparatus is configured to:

determine, based on the data indicative of the geometrical layout, an angular relationship between the outgoing road and a candidate road connected to the incoming road and the outgoing road; and

generate data indicative of the candidate road being the bypass road if the angular relationship satisfies an angular condition for designating the candidate road as the bypass road.

5. The apparatus as claimed in claim 3 or 4, being further configured to:

determine, based on the data indicative of the geometrical layout, an angular relationship between the incoming road and the outgoing road; and

generate data indicative of a directional flow of the incoming traffic through the bypass road based on the angular relationship between the incoming road and the outgoing road.

6. The apparatus as claimed in claim 5,

wherein, if the angular relationship between the incoming road and the outgoing road is determined, starting from the incoming road to the outgoing road in an anti-clockwise direction, to be a reflex angle of between about 220° and about 305°, the apparatus is configured to, for generating the data indicative of the directional flow, generate data indicative of a left directional flow, or

wherein, if the angular relationship between the incoming road and the outgoing road is determined, starting from the incoming road to the outgoing road in a clockwise direction, to be a reflex angle of between about 220° and about 305°,

the apparatus is configured to, for generating the data indicative of the directional flow, generate data indicative of a right directional flow.

7. The apparatus as claimed in any one of claims 1 to 6, further configured to add the data indicative of the turn restriction to the data corresponding to the network of roads.

8. The apparatus as claimed in any one of claims 1 to 7, further configured to, in response to a request from a road user to access data associated with the intersection node, communicate the data indicative of the turn restriction to a device of the road user for communicating the turn restriction to the road user.

9. The apparatus as claimed in any one of claims 1 to 8, further configured to process the data indicative of the turn restriction to generate visual information for communicating the turn restriction to the road users.

10. The apparatus as claimed in any one of claims 1 to 9, further configured to process data indicative of a digital map representative of the network of roads and the data indicative of the turn restriction for displaying the digital map with information corresponding to the turn restriction.

11. A method performed in a processing apparatus for traffic management of a network of roads, the method comprising, under control of a processor of the processing apparatus:

processing data corresponding to the network of roads to identify an incoming road and an outgoing road intersecting at an intersection node of the network, the incoming road being for incoming traffic leading to the intersection node and the outgoing road being for outgoing traffic leading away from the intersection node;

determining, based on the data corresponding to the network, whether there is a bypass road to allow the incoming traffic from the incoming road to bypass the intersection node and flow to the outgoing road via the bypass road; and

if it is determined that there is the bypass road, determining that there is a turn restriction of flow of the incoming traffic to the outgoing road via the intersection node, and generating data indicative of the turn restriction for communicating to road users.

12. The method as claimed in claim 11, further comprising processing the data corresponding to the network of roads to identify an entry node for a first segment of the incoming road and an exit node for a second segment of the outgoing road;

wherein determining whether there is the bypass road comprises:

determining, based on the data corresponding to the network, whether there is a connecting road connected to the entry node and the exit node; and

if there is the connecting road, generating data indicative of the connecting road being the bypass road.

13. The method as claimed in claim 11,

wherein the data corresponding to the network comprises data indicative of a geometrical layout of the network, and

wherein determining whether there is the bypass road comprises determining whether there is the bypass road based on the data indicative of the geometrical layout of the network.

14. The method as claimed in claim 13, wherein determining whether there is the bypass road comprises:

determining, based on the data indicative of the geometrical layout, an angular relationship between the outgoing road and a candidate road connected to the incoming road and the outgoing road; and

generating data indicative of the candidate road being the bypass road if the angular relationship satisfies an angular condition for designating the candidate road as the bypass road.

15. The method as claimed in claim 13 or 14, further comprising:

determining, based on the data indicative of the geometrical layout, an angular relationship between the incoming road and the outgoing road; and

generating data indicative of a directional flow of the incoming traffic through the bypass road based on the angular relationship between the incoming road and the outgoing road.

16. The method as claimed in claim 15,

wherein, if the angular relationship between the incoming road and the outgoing road is determined, starting from the incoming road to the outgoing road in an anti-clockwise direction, to be a reflex angle of between about 220° and about 305°, generating the data indicative of the directional flow comprises generating data indicative of a left directional flow, or

wherein, if the angular relationship between the incoming road and the outgoing road is determined, starting from the incoming road to the outgoing road in a clockwise direction, to be a reflex angle of between about 220° and about 305°, generating the data indicative of the directional flow comprises generating data indicative of a right directional flow.

17. The method as claimed in any one of claims 11 to 16, further comprising, in response to a request from a road user to access data associated with the intersection node, communicating the data indicative of the turn restriction to a device of the road user for communicating the turn restriction to the road user.

18. The method as claimed in any one of claims 11 to 17, further comprising processing the data indicative of the turn restriction to generate visual information for communicating the turn restriction to the road users.

19. The method as claimed in any one of claims 11 to 18, further comprising processing data indicative of a digital map representative of the network of roads and the data indicative of the turn restriction for displaying the digital map with information corresponding to the turn restriction.

20. A computer program or a computer program product comprising instructions for implementing the method as claimed in any one of claims 11 to 19, or a non-transitory storage medium storing instructions, which when executed by a processor cause the processor to perform the method as claimed in any one of claims 11 to 19.