System design for predictive road-traffic information delivery using edge-cloud computing

Abstract

- This paper presents a novel system architecture for predictive road traffic information delivery in which computing resources at the network edge and the central cloud are cooperatively used to analyze sensing data collected by vehicles on the road.
- In this paper, we also present the mathematical problem formulation of the proposed system architecture for ensuring that the system could successfully deliver road-traffic information at real time without overflowed computational and network loads. The numerical examination using a real dataset and a realistic network emulator validates our system.

Existing system

- Such information would help drivers optimize their route in terms of traveling time and fuel consumption. Predictive information on future road traffic would be more useful than current and past information because it would support more dynamic route choices as it would drivers to see how road traffic will likely change in the near future.
- There have been many technical efforts to enable delivery of such fine-grained and predictive information.

Disadvantages

- The cloud assisted Internet of Vehicles (IoV) is thus a promising architecture for delivering fine-grained and predictive information on road traffic conditions to vehicles.
- It is particularly problematic for self-driving vehicles, which can make quicker decisions based on realtime road traffic conditions than human drivers

Proposed system

- In this paper, we also present the mathematical problem formulation of the proposed system architecture for ensuring that the system could successfully deliver road-traffic information at realtime without overflowed computational and network loads.
- The numerical examination using a real dataset and a realistic network emulator validates our system.

Advantages

- fine-grained information on road traffic conditions to vehicles is a straightforward solution to the congestion problem. Such information would help drivers optimize their route in terms of traveling time and fuel consumption.
- Predictive information on future road traffic would be more useful than current and past information because it would support more dynamic route choices as it would drivers to see how road traffic will likely change in the near future. There have been many technical efforts to enable delivery of such fine-grained and predictive information.

Hardware Requirements

- Processor :Intel Pentium IV 1GHz
- RAM :256MB (Min)
- Hard Drive :5GB free space
- Monitor :1024 * 768, High Color inch
- Mouse :Scroll Mouse(Logitech)
- Keyboard :104 keys

Software requirements

- Processor :Intel Pentium IV 1GHz
- RAM :256MB (Min)
- Hard Drive :5GB free space
- Monitor :1024 * 768, High Color inch
- Mouse :Scroll Mouse(Logitech)
- Keyboard :104 keys

conclusion

- This paper presented a novel system architecture for predictive road-traffic information delivery in which computing resources at the network edge and the central cloud are cooperatively used to analyze sensing data collected by vehicles on the road.
- We also presented the mathematical problem formulation of the proposed system architecture for ensuring that the system could ensure realtime delivery and prediction accuracy without overflowed computational and network loads. In the numerical examination using a real dataset and a realistic network emulator.
- we confirmed that, by setting the sampling rates of data transferred from the edge servers to the cloud server with and without conversion from raw data to the structured one appropriately, our system could outperform the conventional system and we could find out suitable parameters for ensuring realtime delivery and prediction accuracy without overflowed computational and network load. Future work includes i) numerical examination using other datasets and ii) system implementation and experiment.

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