TrafficView: How Far Can You See?
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Overview
Dynamic Real-Time View of Traffic Ahead

Vehicle-to-Vehicle Data Exchange Using Short-Range Wireless Communication

TrafficView System
System Architecture

TrafficView Prototype
- HP iPAQs running TrafficView on top of Linux.
- Positions are obtained from GPS receivers connected to iPAQs.
- Communication through 802.11 wireless cards.

Scalable Information Dissemination
Information Aggregations
- Problem: How to disseminate information about cars in dynamic ad hoc networks of vehicles?
- Solution: Aggregate data to see vehicles as far as possible with “acceptable” accuracy loss.
  - Aggregate data for vehicles that are close to each other
  - Perform more aggregation as distance increases
  - Eliminate duplicates

Ratio-based Aggregation
Aggregation ratio: inverse of the number of records that would be aggregated in one record
Portion value: fraction of the remaining space in the broadcast message
1. Calculate region boundaries
2. Calculate merge thresholds
3. In each region, each two consecutive records that are closer than the merge threshold, are merged

Cost-based Aggregation
- The Ratio based algorithm selects the records to be aggregated blindly
- Assign a cost to merging two records, select records corresponding to lowest cost
- Cost function:
  - High cost to close vehicles
  - Minimize error due to merging records
  - Minimize number of cars in merged records

TrafficView Demo
- 3 cars on US highway 1 in New Jersey, right side is the traffic information displayed in the last car
- One movie that shows 4 cars running TrafficView in a real-life traffic scenario.
- In parallel, we show the information displayed by TrafficView at every Car.
- For this demo, we emulate TrafficView using 4 HP iPAQs (one for each car) and a laptop:
  - We recorded the messages received at each car, and each iPAQ re-plays one of these traces.
  - The messages are distributed, in order, to each iPAQ from the laptop that stores all the traces.

http://www.cs.rutgers.edu/discolab/traffic