Advanced Traveller Information Systems

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Advanced Traveler Information Systems provide real-time traffic information to road users and aim at supporting them to manage their mobility more effciently. This article introduces basic concepts of Advanced Traveler Information Systems and gives a short overview of the main issues. In addition to pointing to sources of information and the temporal nature of information for such systems, the potential benefits and drawbacks on influencing driver behavior are discussed.

1 Motivation

Daily recurrent traffic jams reflect the fact that the road networks are not able to cope with the demand for mobility which will still increase in the near future. Hence, one of the objectives of Advanced Traveller Information Systems (ATIS) is to place more emphasis on using the existing infrastructure more efficiently, e.g., by providing information to the road users.

Research on driver information technologies dates back to the 1950s and has evolved over the past 50 years (for an overview see [1]). Although the technologies have advanced, the primary goals remain the same: improve travel efficiency and mobility, enhance safety, provide economic benefits, conserve energy, and protect the environment.

ATIS include a variety of systems that provide real-time, in-vehicle information to drivers regarding navigation and route guidance, motorist services, roadway signage, and hazard warnings. For an overview see [3].

2 Sources of Information

The basis of every ATIS are input data, i.e., measurements from detection devices. In general, one can distinguish locally fixed and moving detectors, e.g., Floating-Cars (FCs):

Inductive Loops.
These are the most common devices, since their structure is simple, they are cheap and have a high reliability. The idea is to detect the amount of metal which crosses a certain area.

Infrared Beacons.
The idea of these devices is to detect cars using the infrared spectrum. Most of the detectors work event-driven, i.e., there is a classification of traffic patterns and whether a significant change between the classes is reported.

Floating Cars.
FCs are employed to investigate traffic conditions on the routes, e.g., to measure speed or link travel times. This information is transmitted to control centres. However, equipping a car with the necessary devices is quite expensive. A cheaper alternative is to track people using positioning functions of their cellular phones. The quality and availablity of this information source is still under scientific debate.

3 Temporal Nature of Information

Since the idea of ATIS is to provide information, the temporal nature of the data as well as its use in traffic scenarios should be discussed briefly. Conceptually, information may fall into three distinct temporal classes [2]:

Historical Data
Historical or after-trip information reflects the previous states of the network. It can be either objective (measured), or subjective (own experience). The objective historical data are used to categorise daily traffic demands and extract heuristics, which can be used for a traffic forecast.

Current Data
Current information is provided real-time and should be the most up-todate information. The basis are data measured by detection devices.

Predictive Data
This kind of data reflects the expected traffic conditions. The predictive information can be short-term, up to one hour, or long-term, up to one day. To provide such data, intelligent algorithms are needed to combine historical and predictive data.

4 Information in Traffic Systems

All temporal classes of data are provided before a trip or during the trip:

Pre-Trip Information: These data are transmitted, e.g., via the Internet or GSM. Since the road user has time to analyse and process it, the amount of information can be higher than for en-route systems.

En-Route Information: In order to support the road user during his trip data, are transmitted en-route or on-trip. Possible modes of transmission are Variable Message Signs (VMS) or radio broadcast. Therefore, the content and amount of information can vary strongly. In general, it should be short and concise.

4.1 Influences on Travel Behaviour

Information systems are only effective if they are able to convince the road user to change his behaviour. In principle, there are four different options:

Spatial The strategy of most information systems is to change the spatial distribution of traffic patterns, i.e., to pro-