Accurate Estimation of Travel Times on the Traffic Data, Extracted from Aerial Image Time Series

Master's Thesis by Mihir Shah

Supervisor:
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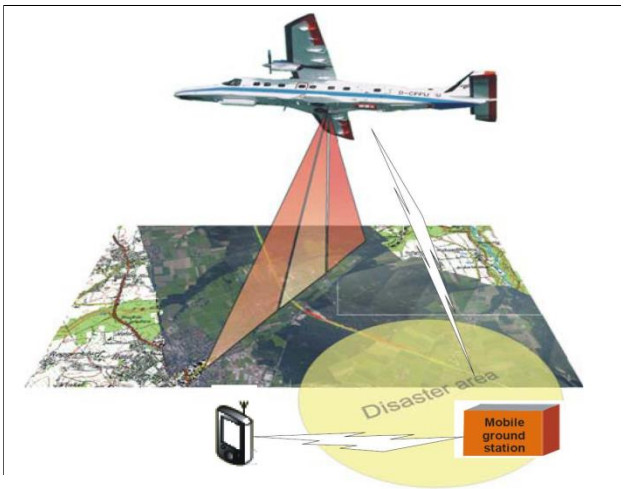
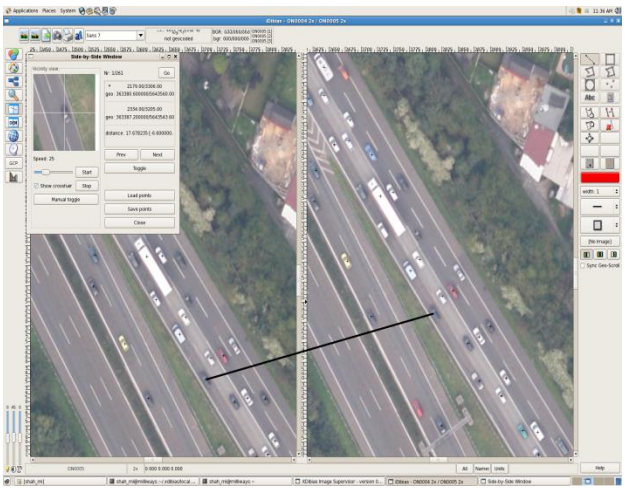


Source: DLR 2013

This system has the capacity to estimate road traffic information such as vehicle positions and vehicle velocities by tracking through image sequences. This Thesis focuses on developing a robust and feasible algorithm for automatic estimation of travel times on a motorway from the extracted traffic data using aerial image sequences. The used aerial image time series were captured on the motorways of Cologne and Munich by the airborne monitoring system.

The ground stationary measurement devices are barely able to handle the daily traffic volumes and thus there is a high chance they could fail in situations arising from catastrophes or traffic disasters. Therefore, a real-time airborne monitoring system for such unforeseen circumstances was developed in the last years at the German Aerospace Centre (DLR).

Source: Gellert et al. 2013



Preliminary analysis was carried out on the image data and Database is understood. The image preprocessing and processing tasks performed on-board the aircraft mainly consists of vehicle detection and vehicle tracking.. Tracking takes place between two consecutive geo-coded images. Entire processing chain is real-time capable.

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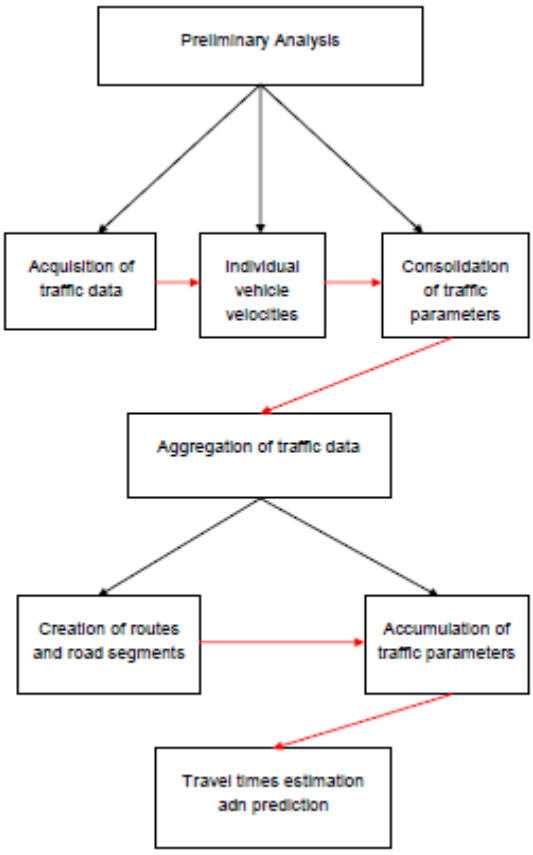

Individual vehicle velocities were derived from the image time series and consolidated. NAVTEQ road database was used to detect road areas along the motorway so that the tracked vehicles can be assigned to a road segment and point-to-point travel times for shorter distances can be obtained. Travel times for the route are derived and also predicted for some road segments by taking into account the traffic flow. The approach for the calculation of travel times is based on the identification of traffic state.

For the validation of proposed methods, results are also compared with the manual deductions of ground stationary infrastructure as well as with the times recorded through the ground run campaign along a 16 km motorway segment of Munich by an ADAC reference vehicle. The conclusion and shortcomings of the approach are discussed at the end of the thesis.