

# Stage Oriented Design of an Intersection Management System Based on Laser Scanner Data

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## Abstract

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evant features of them. The third stage receives the set of features from the previous stage and performs recognition and classification tasks. Also, tracking and prediction of objects' state is performed based on historic information. In the fourth stage, object behaviour and inter-objects interaction are analysed to identify context and detect situation or events of interest. This output could be delivered to an optional fifth stage of decision and control, to a human operator, or to a traffic agent or institution, to take immediate actions on traffic control, issue traffic tickets, warn drivers about possible incidents or improve transportation policies in a long-term basis. In figure 1, previously described stages are depicted, and also is shown how the data volume is reduced while data meaning increases in the last stages.

## 1 Introduction

## 2 Stages Definition

In the designing of an IMS, there are four main stages that have to be performed from the data source to final output: preprocessing, feature analysis, pattern recognition and situation assessment. The aim of the first stage is to extract data of interest from the raw sensor information, using filtering and background subtraction techniques to get the foreground of the scene, remove noise and irrelevant data. Spatio-temporal alignment of data is also performed in this stage. In the second stage, the objective is to identify elements within the foreground and extract rel-

Different tasks could be performed in each aforementioned stages, as is referred in figure 2. Below there is a description of common concepts and methods associated with each of these tasks, some of them are sensor-independent and others are focused on a specific sensor or type of data. Additionally, these tasks could be used as fusion blocks for homogeneous or heterogeneous data.

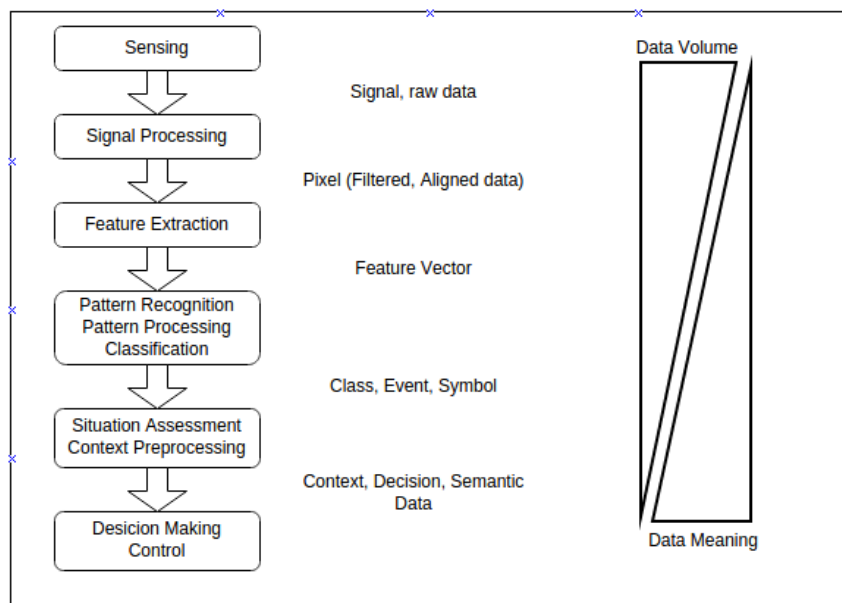


Figure 1: Dataflow through processing stages in an IMS.

	Preprocessing	Feature Analysis	Pattern Recognition	Situation Assesment
Performed Tasks by Stage	Time alignment	Segmentation	Object recognition	Context assessment
	Space alignment	Feature extraction	Object association	Event detection
	Background removal	Feature selection	Object tracking	Situation forecasting
	Data filtering		Object classification	Behaviour Analysis

Figure 2: Processing stages and tasks performed.

### 3 Laser-based System Implementation

### 4 Results

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### 5 Conclusions and Future Work

### References