

Scoping Report - Sample

AutoMap Analysis

A. Customer Details

Name	
Company	
Contact No	
Email	

B. Outcome

Suitability determination	Suitable
Suitability score	6/10

C. Sample Data

The supplied sample video data had the following high level properties

Video Data resolution	640x480 pixels
Frames	Captured at fixed distance, approximately 10m between frames
Interlaced	YES
Compression	MPEG4
Media	DVD Disk
Files	6 files
File size	Total file size of 7.65 GB

The companion sensor data had the following high level properties

Accelerometer	3D accelerometer data capture at fixed time intervals, 20Hz
Gyroscope	1D gyroscopic data capture at fixed time intervals, 20Hz.
GPS	GPS position captured at 5Hz.
Odometer	Odometer data captured at fixed distance, approximately 2m between data points.
Media	DVD Disk
Files	6 files

D. Technical Data Analysis

1. Compression of the video was found to have been done without first separating the individual video fields. This causes “bleeding” of information between the individual lines in the image, making the resulting image have a lower quality than otherwise necessary.
2. The selected compression ratio is set to a level that introduces severe artefacts when the capturing vehicle is turning rapidly.
3. The accelerometer and gyroscopic data are well synchronized with each other. However, the data lacks accurate timestamps relating all the data sources with each other. The provided timestamps have a resolution of 1 second. However the low resolution of the timestamps can be partially overcome by using a predictive and interpolating filter providing timestamp estimates with a resolution of 1ms.
4. The data was captured under varying lighting conditions. During the day as well as during the dark hours of the evening. Occasionally the video is blanked out by the sun.
5. Data captured in city regions sometimes suffered from GPS dropouts of more than a minute.

E. Routine Data Repair Requirements

6. Compression of the video was found to have been done without first separating the individual video fields. A correcting filter needed to be applied and properly tuned in order to proceed with the scoping of the video data. This filter will be used to prepare all source data for processing.

F. Suitability for Automated Processing

Suitability score: 6/10

The supplied video data in its current state can be used for automatic extraction of sign data with the following reasonable expectations:

7. Detection of signs on a **single frame** basis is possible in most cases where the vehicle is driving straight. However, if the vehicle is turning rapidly the high degree of video compression as well as low quality due to interlacing may reduce the detection performance significantly.
8. Detection of signs on a **multiple frame basis** is possible in most cases where the vehicle is driving straight. In sharp turns, however, detection of signs will have to rely on the single frame mode. The distance of

- 10m between frames causes this problem as many signs will not be visible in more than one frame.
9. A sign that is detected in multiple frames will have lower error in its computed geographic location. A sign detected in only a single frame will have a larger error in its computed geographic location.
 10. Given the capture rate of 10m between frames, a common case will be to rely on the single frame detection mode in order to achieve a sufficient detection rate but geographic location accuracy may suffer.
 11. Signs can still be detected in regions where there is a GPS dropout and can later be referred to via, for example, the name of the video sequence and its frame number. Alternatively, if preferred by the customer, an estimate of the geographic location can be provided, but flagged to be of higher uncertainty.
 12. Regions with extremely dark footage and footage blanked out by the sun will cause the system to be unable to detect signs

Although several issues has been identified, it is likely that the video data can be used to automatically detect road signs at a performance level equal to, or better than, manual inspection.

G. Special Requirements for Processing

[Optional] Additional computation time

Some data sources require additional computation time to process. If your data requires additional processing resources the detailed are listed here.

The data samples provided fall within our normal processing range.

[Optional] Advanced data repair engineering

Some data sources contain errors which are unable to be fixed using standard techniques, but can likely be fixed by our engineers. If your data requires additional repairs which will likely make it suitable for processing the details are listed here.

The data samples provided do not require any data repair engineering.

H. Recommendations for Future Video Capture

Base on our analysis, we recommend you alter you capture processes to closer to the following parameters to improve the usable information which can be extracted. Small and easy configuration changes in your capture setup can have a significant impact on the usable data we can extract.

Video Data Parameters

Frame Rate	Minimum 5m, preferably 2.5 m or less

Companion Sensor Data Parameters

Time stamping	Prefer a resolution and accuracy of 1ms

Further more, we recommend the following specifically

13. The most important aspect to improve on would be to increase the capture rate to a maximum of 5m between frames, or even better, 2.5m. This would enable relying much more heavily on the multiple frame detection mode, which would significantly reduce the number of false positives, as well as improve on the geo location accuracy. GPS dropouts of 30 seconds or more could then be coped with without a complete loss of location estimates.
14. To further increase geo location performance, and to better handle GPS dropouts, means to properly synchronize the data sources should be introduced, and providing associated timestamps with both a resolution and accuracy of 1ms
15. Dark footage and blanked out footage can be improved upon by using a higher end camera system with faster shutter times and/or a logarithmic response to increase the dynamic range.
16. Coping with footage blanked out by the sun can also be achieved by pointing the camera in a different angle relative to the vehicle, or through some other means placing it in the shade.
17. Reflections can be dealt with through the use of a polarizing filter.

- END OF REPORT -