

APPLICATION OF IMAGE ANALYSIS TO THE IDENTIFICATION AND RATING OF ROAD SURFACE DISTRESS

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PURPOSE

Automatic inspection of roads to detect and rate surface distress is of major interest in conditions survey and maintenance management. The objective of this research is to develop algorithms suited to detect automatically narrow cracks (1mm or wider) on bituminous pavements in various conditions including presence of humidity, shade, local repairs, joints,...

APPROACH

The image treatment is processed in three stages, each of them being subdivided in one or more tasks:

- the **pre-treatment** consists mainly in applying a background correction to eliminate the heterogeneity due to humidity, shade, ...;
- in the **treatment**, a threshold value is applied to segment the "objects" from the rest of the image;
- as the objects may be cracks, part of cracks or some noise erroneously segmented as defect, a **post-treatment** is applied to appreciate more accurately if a pixel belonged to an object or to the background. It aims also to assembly parts of cracks in continuous structure.

Figures 1 to 4 illustrate the various stages of the process, starting with the green channel of the original image, the uniformisation of the background, the segmented image and the detected cracks.

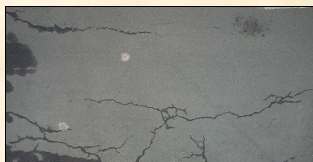


Fig. 1. Original image

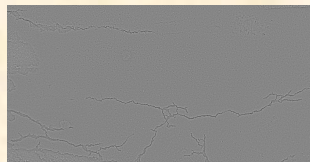


Fig. 2. Image with uniform background

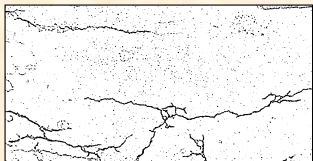


Fig. 3. Segmented image

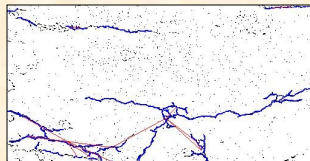
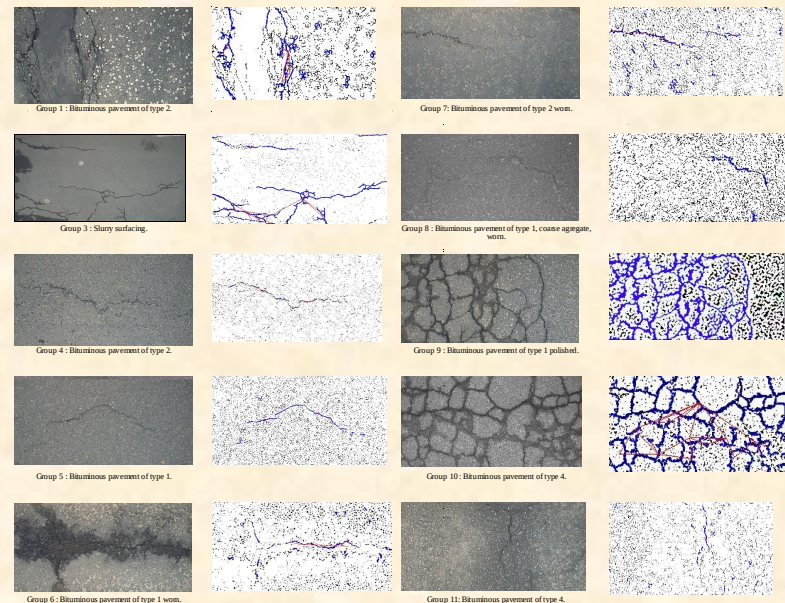


Fig. 4. Detected cracks

RESULTS

Algorithms were tested on 81 images of bituminous pavements sorted in 11 groups according to their texture, their wetness and their wear. Examples of results are given below. Comparing initial and final image, it is obvious that an efficient detection of cracks has been obtained and that parts of cracks initially considered as singular elements are assembled in conformity with visual appreciation.



CONCLUSION

The proposed algorithms are efficient to correct the image background in order to eliminate the heterogeneity due to humidity, shade, ... On the treated images, they are able to detect narrow cracks on bituminous pavements. Further work is done to get an automatic detection not only of cracks, but also other distresses, whatever the road texture.

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