

PROCESS AUTOMATION OF AN ESTIMATION FOR RELATIVE DENSITY OF WOOD PLANTINGS THE INSTRUMENTALITY OF METHODS OF DIGITAL IMAGE PROCESSING

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The program on automation of process of an estimation of relative completeness of wood plantings is developed. It is experimentally confirmed, that the synthesised algorithms allow to shorten of conducting for such researches at maintenance of demanded accuracy of results.

Introduction

One of the basic problems in the field of image processing and pattern recognition is revealing of installations on difficult and statistically non-uniform background [1]. In particular, in a forestry at an estimation of relative completeness of wood plantings, it is necessary to detect images of trunks of trees, to measure a rule of their boundary lines on a horizon line (fig. 1).



Fig. 1. The image of wood plantings

The tool for automation of such researches for today is absent, and manual methods are very labour-consuming, long and economically cost-based. The present work also is devoted questions of automation of conducting of the given kind of researches.

The work purpose:

Programming tool for automation of process of an estimation employing digital images of the wood plantings providing essential acceleration of measurements at conservation of given accuracy.

Solved tasks:

- 1) Synthesis of optimum algorithm of detection of boundary lines of a hum and prototype system on digital images of a perspective view;
- 2) Designing the programm for automatic and manual operating modes of an estimation for parametres of relative completeness of wood plantings;
- 3) Documenting of results of work at conducting of researches, and also database conducting on history of researches;
- 4) Implementation of functions of a binding of images to global system of positioning GPS using protocol NMEA [2];

Results of synthesis of algorithms:

In an assay value of statistical and correlation properties of typical images, (fig. 1 see) synthesis of an analysis algorithm of images and its programm implementation have been done. The Block diagramme of complex algorithm according to relative completeness of wood plantings is resulted in drawing 2. The basic stages of work of the developed algorithm the following:

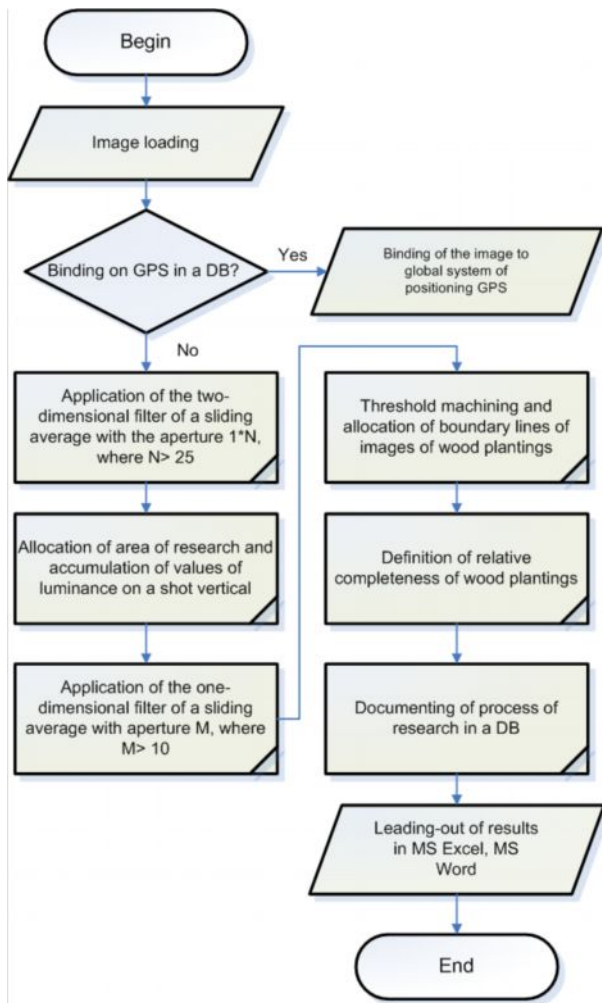


Fig. 2. Complex algorithm of working program

1. The two-dimensional space filtering is applied to elimination baseline and textural noise along images of wood trunks with the aperture $1 \cdot N$, where $N > 25$ [3]. The final image after a filtering stage is resulted on fig. 3.

2. As a result of the previous operation the estimation of distribution of luminance along a horizontal axis in the field of horizon (fig. 3) is formed.

3. The signal/noise of distribution of luminance along a horizontal axis and means of elimination the emissions of distribution serves as a following stage of raise of the relation an one-dimensional filtering of a sliding average with aperture $M \cdot 1$, the result of a filtering is resulted on fig. 4.

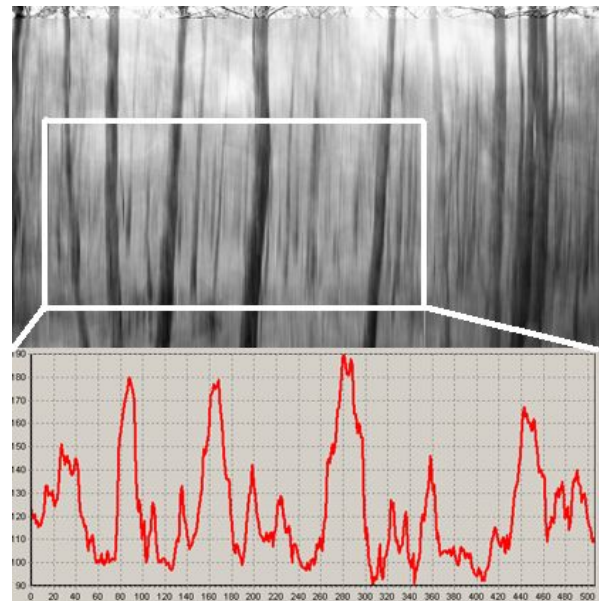


Fig. 3. Result of accumulation of the inverted values of luminance in the set right-angled area and researches

4. At a following stage operation the detection of images projections of wood trunks on the basis of threshold machining with the value of the threshold appointed according to the set optimisation [4] is carried out.

5. At the machining closing stage, deposits the left and right boundary lines of images of wood plantings and the target parametre - their relative completeness (fig. 5) is defined.

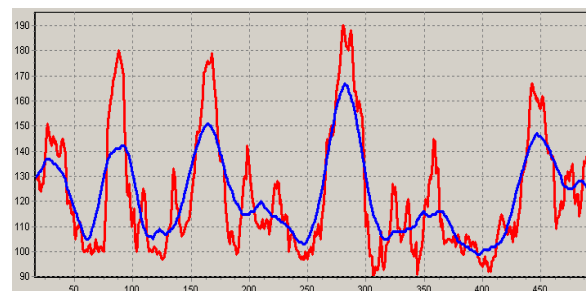


Fig. 4. Application of the filter of a sliding average with aperture $M \cdot 1$ (51×1) for the gained area of research

6. In end of working algorithm function of documenting of results of machining in the developed relational database is realised. Also the mechanism of exportation of results of the spent researches in well-known formats MS Word, MS Excel is realised.

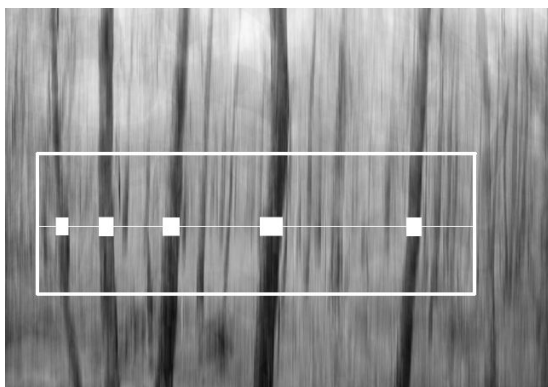


Fig. 5. Result of detection of areas matching to wood plantings

Conclusion

1. The program complex which allows to automate process of an estimation of relative completeness of wood plantings is developed.
2. Algorithms implemented in the program are optimum by traditional criteria and differ objective character of conducting of measurements.
3. The given program complex has possibility to document results of researches in a database, and also uses function of a binding of digital images to system of globally positioning GPS.
4. The offered program complex can be used at conducting of engineering and scientific researches in the field of a forestry for raise of their reliability and productivity.

References

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