Summary of Paweł Popielski PhD thesis entitled "Finding Correspondence of Feature Points on the Stereovision Images"

Doctoral Theses:

1. Dedicated Methods of Analysis and Processing of Stereovision Images Enable to Improve a Quality of Stereo Correspondence Results.
2. Introduction of New Attributes of Feature Points Allows to Improve the Efficiency of the Stereo Correspondence Algorithms.

The aim of the dissertation is to develop a method that allows to find matches between feature points on stereo vision images. Proposed method is dedicated to medical applications. Achieving the goal of the dissertation required several partial goals.

1. Developing of medical images segmentation method.
2. Developing of matching method.
3. Evaluation of matching quality.
4. Evaluation of influence of the selected feature points attributes on stereo correspondence quality.
5. Final optimization of algorithms to work on subcutaneous vessels images.

Results presented in the thesis.

- Three image segmentation methods BGOM, SSSB and BLG.
- Three matching methods MED, MED-NDD and MED-RGB.
- First method (MED) is based on the assumption that the correct disparity is the minimal distance between given feature point on the left image and all feature points on the right image in the given row.
- Second method (MED-NDD) improves the results obtained with the first method by 30% for selected images.
- Third method (MED-RGB) improves the results obtained with the first method by 30% for selected images.
- **Quality evaluation** of the created disparity map accordingly to three accuracy criteria and reference ground true disparity map.
- **Evaluation of influence** of the new feature point attributes to stereo correspondence results. Attributes were properly selected improving an average results by 12%. However, to clearly state the values of error-minimizing attributes would have to be carried out further research on properly prepared image database.
- **Dedicated algorithms** to cope with medical images of subcutaneous vessels that present much better effectiveness in comparison to existing widely used methods.
- Proposed in dissertation algorithms are the quickest what follows from the presented comparisons.

The methods were tested on three groups of test images namely solids, subcutaneous vessels and real images from the Middlebury College Stereo Vision library..

Based on the above, it must be stated that the conducted research confirms the correctness of the theses formulated at the beginning of the work.