WYDZIAŁ INŻYNIERII BIOMEDYCZNEJ

POLITECHNIKA ŚLĄSKA

ROZPRAWA DOKTORSKA

Metody przetwarzania obrazów układu sercowo – naczyniowego

do analizy blaszek miażdżycowych

AUTOR
mgr inż. Ewelina Sobotnicka

PROMOTOR
Prof. dr hab. inż. Janusz Jeżewski

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SUMMARY

SUMMARY OF THE DOCTORTAL THESIS

"Cardiovascular image processing methods for atherosclerotic plaque analysis"

The doctoral dissertation addresses the topic of cardiovascular image processing in the context of atherosclerotic plaque analysis. The main objective of the dissertation was to evaluate selected segmentation methods for application to monitoring the dynamics of atherosclerotic changes, in order to support decisions on additional diagnostic measures in this area.

The research proposed in the doctoral dissertation aims at gaining new knowledge that will allow the proper and precise detection of atherosclerotic plaques, which will translate into improved clinical effectiveness of the coronary flow analysis process in the future.

The research material consisted of actual medical data from Computed Tomography (CT) examinations. The first stage of the work was related to the creation of a database containing 43 clinically relevant images showing the locations of atherosclerotic plaques. The accumulated database represents a valuable source of clinical data, due to the fact that this type of collection is not widely available. The next stage of the work consisted of segmentation using two proposed segmentation methods: region growing and the gradient method.

The results obtained using the proposed segmentation methods were compared with reference data, as well as with the results obtained when segmenting using a free commercial programme. The comparison of the results obtained with the segmentation methods proposed in the doctoral thesis, was mainly based on a set of selected dedicated metrics to assess the quality of segmentation. The results obtained by the Author of the doctoral thesis, indicated the usefulness of the gradient method for the analysis of images representing atherosclerotic plaques.