Brno University of Technology
Faculty of Information Technology

Department of Intelligent Systems (DITS) Academic year 2020/2021

Bachelor's Thesis Specification

Student: **Otčenáš Matej**
Programme: Information Technology
Title: **Detection, Extraction and Measurement of the Contour and Circumference of the Metacarpal Bones in X-Rays of the Human Hand**
Category: Image Processing
Assignment:

1. Get familiar with image processing and segmentation of an X-ray of the hand.
2. Design algorithm for detection and extraction of contour and measurement of the circumference of the third metacarpal bone.
3. Implement the designed algorithm and test it on the provided database by the Department of Anthropology, Faculty of Science, Masaryk University.
4. Review the achieved results and discuss the possible extensions.

Recommended literature:

- STOLOJESCU-CRISAN, Cristina; HOLBAN, Stefan. An Interactive X-Ray Image Segmentation Technique for Bone Extraction. In: *IWBBIO*. 2014. p. 1164-1171.
- JENA, Shweta; SAHU, Barnali; JAGADEV, Alok Kumar. Analysis of medical X-ray bone images using image segmentation. In: *Intelligent Computing, Communication and Devices*. Springer, New Delhi, 2015. p. 787-794.
- AREECKAL, Anu Shaju; SAM, Mathew; DAVID, S. Sumam. Computerized radiogrammetry of third metacarpal using watershed and active appearance model. In: *2018 IEEE International Conference on Industrial Technology (ICIT)*. IEEE, 2018. p. 1490-1495.HUE, Tran Thi My; KIM, Jin Young; FAHRIDDIN, Mamatov. Hand bone radiograph image segmentation with roi merging. *Recent Researches in Mathematical Methods in Electrical Engineering and Computer Science*, 2011, 147-154.
- DAVIS, Luke M., et al. On the segmentation and classification of hand radiographs. *International journal of neural systems*, 2012, 22.05: 1250020.

Requirements for the first semester:

- Items 1 and 2.

Detailed formal requirements can be found at https://www.fit.vut.cz/study/theses/

Supervisor: **Drahanský Martin, prof. Ing., Dipl.-Ing., Ph.D.**
Head of Department: Hanáček Petr, doc. Dr. Ing.
Beginning of work: November 1, 2020
Submission deadline: May 12, 2021
Approval date: November 11, 2020