Information on Doctoral thesis of Fellows Ma Thi Chau

1. Full name: Ma Thi Chau

2. Sex: Female

3. Date of birth: 08/05/1981

4. Place of birth: Thai Nguyen

5. Admission decision number 2389/SDH, dated 29/06/2007 by President of Vietnam National University, Hanoi

6. Changes in academic process: No

7. Official thesis title: Study a number of techniques to reconstruct 3D face from the skull.

8. Major: Computer Science

9. Code: 62.48.01.01

10. Supervisors:

Assoc. Prof. Dr. BUI THE DUY

Prof. Dr. TAE – WAN KIM

11. Summary of the new findings of the thesis:

Three main achieved results

In the process of reconstructing three-dimensional face from the skull based on soft tissue thickness, I propose the following three algorithms:

- I proposed algorithm of digitized three-dimensional skull from two-dimensional images of the skull. In this algorithm, I analyzed the sift error issuing while taking pictures and limited the effect of sift error on three-dimensional skull building. Solutions contribute to reducing 13% to 36% average error and the largest error when comparing three-dimensional skull characteristics after adjustment with original skull than before adjustment.

- I proposed algorithm extracting automatically features on the three-dimensional digitalized skull . This algorithm helped eliminating mistakes arising when users extract features manually. The algorithm

reduces the computation time compared to other three-dimensional feature detection techniques. The algorithm also reduces the time in the process of three-dimensional facial reconstruction from the skull. Feature extraction was only performed on the surface of the skull. Therefore, the complexity of the algorithm is reduced comparing to the use of three-dimensional masks to extract features across the entire three-dimensional space contain data. Instead of complexity O (n^3N) has only O (N) + O (n^3N ') with N '<< N.

- I proposed algorithm of faces from skulls. Face results obtained by morphing the a face template to fit the skull due to soft tissue thickness at some locations of the landmarks on the skull. In this algorithm, I built the formula for calculating the thickness of facial soft tissue from skull measurements. I also interpolated additional soft tissue thickness in other skull landmark locations where there is no formula of soft tissue thickness calculation. The accuracy of face when combined face by RBF morphing with soft tissue interpolation increased 20% compared with no soft tissue interpolation. Average error is 1.2mm when comparing the reconstructed face and the real face.

12. Practical applicability: The results of the thesis have many potential applications in practical issues such as identification, criminal science.

13. Further research directions: 3D reconstruction

14. Thesis-related publications:

Ma Thi Chau, Bui The Duy (2007), “A process of building 3D models from images”, *Vietnam National University Journal of Science, Mathematics and Physics*, VNUH, ISSN 0866 – 8612, 23(1), pp. 9-14.

Thi Chau Ma, The Duy Bui (2008), “Voronoi based image matching”, *In Pro. of The 11th national information Technology Conference: Some Selected Issues of Information Technology and Communication*, Hue, Vietnam, pp. 136-142.

Dinh Quang Huy, Ma Thi Chau, Bui The Duy , Nguyen Trong Toan, Nguyen Dinh Tu (2011), ”Facial soft tissue thicknesses prediction using anthropometric distances”, *In Pro. of The 3rd Asian conference on intellegent information and database systems*, Studies in Computational Intelligence , Springer –Verlag, ISBN 978-3-642-19952-3, 351, pp. 117- 126.

Thi Chau Ma, Dinh Tu Nguyen, Quang Huy Dinh and The Duy Bui (2011), “3D facial reconstruction system from skull for Vietnamese”, *In Pro. of The 3rd International conference on Knowledge and Systems Engineering*, KSE’2011, Hanoi, Vietnam, IEEE, ISBN 978-1-4577-1848-9, pp. 120 - 127.

Thi Chau Ma, Dinh Tu Nguyen, Quang Huy Dinh (2011), “Reconstructing 3D facial model from skull”, *Vietnam National University Journal of Science, Natural Sciences and Technology*, VNUH, ISSN 0866 – 8612, 27(4), pp. 213 – 221.

Thi Chau Ma, Dinh Tu Nguyen, The Duy Bui, Trung Kien Dang (2011), “3D facial modeling from pair of images”, *Journal on Information and Communication Technologies*, 09/2011, ISSN 1859-3526, 6(26), pp. 217-224.

Thi-Chau Ma, Chang-soo Park, Kittichai Suthunyatanakit, Min-jae Oh, Tae-wan Kim,Myung-joo Kang and The-Duy Bui (2011), “Features Detection on Industrial 3D CT Data”, *In Pro. of The 2011 international conference on multimedia, computer graphics and broadcasting,* Communications in Computer and Information Science, Springer-Verlag, ISBN 978-3-642-27186-1 part 2, 263, pp. 345-354.

Thi-Chau Ma, The-Duy Bui, Trung-Kien Dang (2012), “Shift error analysis in image based 3D skull feature reconstruction”, *In Pro. of The 4th International conference on Knowledge and Systems Engineering*, KSE’2012, Danang, Vietnam, IEEE2012, ISBN 978-0-7695-4760-2, pp. 4 -10.