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:


