Development of a Patient Face Recognition System in the Radiology Department

(Patient recognition accuracy of a face mask-enabled face recognition system in a CT examination environment)

HITOYUKI OTA*1, TOSHIYUKI SHIBUYA*1, CHIKARA MANO*1, YASUHISA MURAMATSU*1, TATSUSHI KOBAYASHI*1, AKIRA TAKAGI*2, TOMONARI TANIGUCHI*2, DAIGO HAYASHI*2, TOMOYUKI KUBOTA*2

*1 National Cancer Center Hospital East
*2 CANON MEDTECH SUPPLY Co.Ltd
Purpose

Patient misidentification causes serious accidents in medical practice. Although facial image-based recognition systems have been used in many fields, they have not been used for patient recognition during examinations.

The purpose of this study is to evaluate a newly developed face mask-enabled face recognition system in a CT examination environment.
The facial recognition system used was PFAS with mask (CANON MEDTECH SUPPLY, Kawasaki, Japan).

- 142 patients
(mean age 59 +/- 11 years, male/female ratio 59:41)

Cameras were installed to capture the patients. Recognition was possible in both of these situations.
- When they entered the CT room (walking).
- When they were positioned (supine).
Method

- The recognition task was performed with the face mask worn, and the success rate was calculated from the recognition score.
- A significant difference test was conducted using Welch’s t test for the authentication scores obtained in the two situations.
- In this system, an authentication score of 550 or higher (max:1000) is considered as a successful authentication.
Method - Information linkage -

Face mask enabled
Registration Recognition

Walking
Authentication camera

Supine

Recording Server
(Recording system)

Face Registration
Tablet Terminals

Authentication Tablet Terminals

Authentication Terminals

Face information database

Wireless Access Point

Camera image linkage

Camera image linkage

Face Recognition Module

Authentication information linkage

Authentication information linkage

Server room

CT room

Reception
Method - Recognition flow -
Result

✓ Of 142 patients, 136 were successfully authenticated, for a success rate of 96%.
✓ The reasons for the unsuccessful cases.
  • The patients were wearing hats too deeply.
  • 3 cases of overlapping with staff members.
  • 2 cases of unknown cause.
✓ Of the 136 patients, 113 (83%) were authenticated when entering the room (walking) and 23 (17%) when positioning (supine).
The mean authentication scores (mean +/- standard deviation) are:

- Entry (walking) 648 +/- 66
- Positioning (supine) 643 +/- 64

No significant difference (p>0.05) between the two.
Discussion

✓ High authentication accuracy.
   Two-way authentication provides more opportunities to recognize faces.

✓ Efficient authentication flow.
   Smooth face registration and stress-free face authentication.

✓ Possibility of face recognition in hospitals.
   Face recognition is possible in multiple situations.

➢ The system can be used in the clinical practice to prevent patient misidentification.
Conclusion

✓ We confirmed that the accuracy of face recognition can be ensured even when the patient is wearing a face mask.

✓ We have realized the practical application of patient authentication using the face recognition system.