Construction of a Face Recognition Program for Family Robots

Nguyễn Minh Tuấn
Thai Nguyen University of Information and Communication Technology
Thai Nguyen University, Thai Nguyen, Vietnam
dtc16hd5103030007@ictu.edu.vn

***Abstract*—This thesis develops a face-recognition program for a family robot using a Raspberry Pi, Python, and camera-based image processing. The implementation acquires images, trains recognition data, and displays an identified person's name or an unknown-person label. The author reports approximately 80% correct recognition in the experimental work. The conclusion also notes signal noise and slow processing, so the prototype requires further improvement before practical use. The report describes the design, implementation, and testing steps and identifies faster processing and more reliable recognition as directions for future development.**

***Index Terms*—face recognition, Raspberry Pi, Python, OpenCV, Alphabot**

I. Introduction

The thesis introduces the development of a face recognition program for family robots, emphasizing the use of the Raspberry Pi and Python programming. The goal is to create a system that can recognize family members to improve the interaction and service capabilities of the robot. The program is expected to recognize up to 10 family members with an accuracy of approximately 80%. However, due to time constraints, the program still has some limitations and potential improvements are suggested for future work. The project was completed within the given timeframe but faced challenges due to time constraints, leading to some unimplemented features and potential improvements for future work [1]. Published articles on the methods and subject of this project provide context for this English summary [5], [6], [7], [8], [9], [10], [11].

II. Methods

The methods section covers the study of Python programming, image processing with Raspberry Pi, and the development of a face recognition program for the Alphabot robot. The author uses the OpenCV library for image processing and the LBPHFaceRecognizer for face recognition. The program was developed and tested, with the author reporting approximately 80% correct recognition in the experiments. However, the program still has some noise issues affecting signal quality and processing speed. The author suggests that future work should address these limitations and improve the program's speed, efficiency, and accuracy. The project was completed within the given timeframe but faced challenges due to time constraints, leading to some unimplemented features and potential improvements for future work [1].

Supervisor: Lê Văn Chung, Thai Nguyen University of Information and Communication Technology (lvchung@ictu.edu.vn).

III. Results

The program was developed and tested, with the author reporting approximately 80% correct recognition in the experiments. However, the program still has some noise issues affecting signal quality and processing speed. The author suggests that future work should address these limitations and improve the program's speed, efficiency, and accuracy. The project was completed within the given timeframe but faced challenges due to time constraints, leading to some unimplemented features and potential improvements for future work [1].

IV. Discussion

The source sets a design target of recognizing fewer than ten family members, but its conclusion reports recognition accuracy separately. The approximately 80% figure is an outcome stated for the author's experiments, without a detailed confusion matrix or independently verified benchmark. Signal noise and slow processing affected the prototype, and the author identifies these as obstacles to practical deployment. Future work would need to improve speed, reliability, and the quality of recognition under realistic operating conditions [1].

V. Conclusion

The thesis documents a Raspberry Pi and Python face-recognition prototype for a family robot. Its camera-based program can display an identified person's name or mark an unrecognized face as unknown. The author reports approximately 80% correct recognition in experimental work and acknowledges signal noise and slow processing. The planned number of family members is a design target, not the reported size of the experiment. The source proposes further development before the system can be used reliably in practice [1].

References

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