A FACIAL EXPRESSION SURVEILLANCE SYSTEM FOR ENHANCED SECURITY IN COMMERCIAL SPACES

AMO GILBERT & OSEI ROY JAKE SARFO

SUPERVISOR: DR. K.O. PEASAH

College of Science | Department Of Computer Science | KNUST, Ghana

ABSTRACT

The project revolves around the development and implementation of a Facial Expression Surveillance System for Enhanced Security in Commercial Spaces (FESSECS). This innovative system utilizes advanced facial expression analysis technology to enhance security measures. By analyzing real-time facial expressions, the system proactively identifies potential security threats and unusual behaviors, providing a valuable tool for risk mitigation. This research contributes to the ongoing discourse on technology integration and security while offering a comprehensive solution for creating safer and more customer-centric commercial environments.

INTRODUCTION

The project introduces an innovative initiative aimed at bolstering security and customer experiences within commercial spaces
such as banks and airports. By harnessing advanced facial expression analysis technology, the project seeks to revolutionize the way security is approached in these environments. Unlike traditional security systems, the focus is not solely on reactive responses, but on proactive measures that leverage real-time facial expression data to identify potential threats and anomalous behaviors before they escalate. This forward-looking approach aligns with the growing demand for comprehensive security solutions in modern settings.

PROBLEM STATEMENT

The project identifies a crucial challenge in the security landscape of modern commercial spaces, specifically banks and airports. Traditional security measures often rely on reactive responses, which might not effectively prevent security breaches or unusual activities.
There is a need for an advanced solution that enhances security proactively. The project's problem statement underscores the necessity for a technology-driven approach that employs real-time facial expression analysis to identify potential threats and anomalous behaviors.

AIM & OBJECTIVES

Aims:
1. Develop and implement a Facial Expression Surveillance System
for Enhanced Security in Commercial Spaces (FESSECS).
2. Leverage facial expression analysis technology to enhance
security measures and customer experiences in banks and airports.

Objectives:
1. Create algorithms for real-time facial expression analysis.
2. Train machine learning models for accurate emotion recognition based on facial expressions.
3. Integrate the FESSECS system with existing security infrastructure within commercial spaces.

METHODOLOGY AND TOOLS USED IN BUILDING

The project follows a systematic methodology that encompasses various stages, from system design to implementation and evaluation. It begins with a thorough understanding of the requirements and context of commercial spaces like banks and airports. The development process involves creating algorithms for real-time facial expression analysis, training machine learning models for emotion recognition, and integrating the system with existing security infrastructure. Ethical considerations are embedded throughout the process, including mechanisms for informed consent and data protection. The methodology ensures a holistic and responsible approach to technology integration.

TOOLS
1.Python Programming Language
2.OpenCV
3.TensorFlow
4.Camera

IMPLEMENTATION

The implementation phase of the project involves transforming the conceptual design and methodologies into a functional Facial Expression Surveillance System for Enhanced Security in Commercial Spaces (FESSECS). This phase encompasses the development of software algorithms, integration of hardware components, and rigorous testing to ensure the system's effectiveness.

RESULT ANALYSIS

1.Emotion Recognition Accuracy: The accuracy of the machine learning models in recognizing various facial expressions is thoroughly evaluated. A diverse dataset is used to validate the system's ability to correctly identify different emotions.

2.Security Alert Triggering: The responsiveness and effectiveness of security alerts triggered by the system are assessed. Simulated scenarios and real-world tests help determine the system's ability to proactively identify potential threats.

3.Hardware-Software Integration: The integration between hardware components (e.g. cameras)
and software algorithms is scrutinized to ensure seamless functioning and synchronization.

CONCLUSION

The conclusion of the project marks the culmination of efforts to develop and implement the Facial Expression Surveillance System for Enhanced Security in Commercial Spaces (FESSECS). This innovative system harnesses cutting-edge technology to enhance security measures and customer experiences within banks and airports..

REFERENCES

1] Yang, M.-H., Kriegman, D. J., & Ahuja, N. (2002). Detecting faces in images: A survey. IEEE Transactions on pattern analysis and machine intelligence, 24(1), 34-58.

[2] Kartali, A., Roglić, M., Barjaktarović, M., Đurić-Jovičić, M., & Janković, M. M. (2018). Real-time Algorithms for Facial Emotion Recognition: A Comparison of Different Approaches. Paper presented at the 2018 14th Symposium on Neural Networks and Applications (NEUREL).

[3] Sharifara, A., Rahim, M. S. M., & Anisi, Y. (2014). A general review of human face detection including a study of neural networks and Haar feature-based cascade classifier in face detection. Paper presented at the 2014 International Symposium on Biometrics and Security Technologies (ISBAST).

[4] Viola, P., & Jones, M. (2001). Rapid object detection using a boosted cascade of simple features. CVPR (1), 1(511-518), 3.

[5] Shojaeilangari, S., Yau, W.-Y., Nandakumar, K., Li, J., & Teoh, E. K. (2015). Robust representation and recognition of facial emotions using extreme sparse learning. IEEE Transactions on Image Processing, 24(7), 2140-2152.

[6] Yuan, N., Kang, B. H., Xu, S., Yang, W., & Ji, R. (2018). Research on Image Target Detection and Recognition Based on Deep Learning. Paper presented at the 2018 International Conference on Information Systems and Computer Aided Education (ICISCAE).

[7] Valstar, M. F., & Pantic, M. (2011). Fully automatic recognition of the temporal phases of facial actions. IEEE Transactions on Systems, Man, and Cybernetics, Part B (Cybernetics), 42(1), 28-43.