Sistem Keamanan Pintu Otomatis Berbasis Gerakan Tangan Menggunakan Algoritma *Squeeze And Excitation Residual Network*

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ABSTRAK

Penularan virus maupun bakteri dapat terjadi karena berbagai aspek, salah satunya adalah persebaran melalui percikan udara atau melalui sentuhan berbagai benda. Hal ini dapat terjadi di area manapun, termasuk akses masuk rumah sakit. Akses masuk rumah sakit dilalui banyak orang yang tidak diketahui rekam jejak sentuhan objek diluar rumah sakit. Oleh karena itu, dibutuhkan sistem kemanan *non contact* sesuai dengan protokol kesehatan dalam mengurangi persebaran virus dan bakteri. Terdapat beberapa metode yang umumnya digunakan dalam sistem kemanan pintu *non contact* diantaranya adalah metode wajah dan suara. Meskipun kedua metode tersebut mampu menjadi sistem keamanan secara akurat, baik metode wajah dan metode suara masing-masing memiliki keterbatasan jika diterapkan pada protokol kesehatan, seperti metode identifikasi wajah kurang efektif dikarenakan pengguna harus memakai masker dan metode suara kurang aman dikarenakan droplet air liur dapat menyebar bersama dengan suara seseorang. Sistem keamanan *non contact* yang dapat diusulkan adalah dengan metode kode tangan atau kode bentuk jari. Hal ini karena selain tanpa sentuhan, sistem kemanan kode tangan sesuai dengan protokol kesehatan.

Penelitian ini bertujuan untuk mengetahui desain sistem kemanan pintu otomatis *non contact* berbasis kode tangan, mengetahui model arsitektur gabungan *Squeeze and Exicitacion Residual Network* (*SE-ResNet*) untuk menyelesaikan kalsifikasi kode tangan dan mengetahui teknik meningkatkan performa klasifikasi kode tangan dengan model blok *Squeeze and Exicitacion Residual Network (SE-ResNet)*. Penelitian dilakukan dengan pembuatan skenario perbandingan algoritma *Convolutional Neural Network* tanpa blok SE-ResNet dan dengan tambahan blok SE-ResNet.

Berdasarkan pelatihan model, skenario *Convolutional Neural Network* dengan tambahan blok SE-ResNet memiliki performa lebih baik daripada tanpa tambahan blok SE-ResNet. Skenario dengan tambahan blok SE-ResNet pada dataset kode tangan dengan segemntasi tipe biner (hitam putih) mencapai 95,85 %, dan validasi akurasi mencapai 95,31 %, serta model yang dirancang mampu memprediksi 42 gambar baru.

Kata kunci: *Hand Gesture Recognition*, *Convolutional Neural Networks, Squeeze Exicitation Residual Network*

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Hand Gesture Based Automatic Door Security System Using Squeeze And Excitation Residual Networks

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ABSTRACT

Transmission of viruses and bacteria can occur due to various aspects, one of which is spread through airborne droplets or through the touch of various objects. This can occur in any area, including hospital entrances. Access to the hospital is passed by many people whose track record of touching objects outside the hospital is unknown. Therefore, a non-contact security system is needed in accordance with health protocols in reducing the spread of viruses and bacteria. There are several methods commonly used in non-contact door security systems including face and voice methods. Although both methods are capable of being an accurate security system, both the face method and voice method each have limitations when applied to health protocols, such as the face identification method is less effective because users must wear masks and the voice method is less secure because saliva droplets can spread along with a person's voice. The non-contact security system that can be proposed is the hand code or finger shape code method. This is because in addition to being touchless, the hand code security system is in accordance with health protocols.

This study aims to determine the design of a hand code-based non-contact automatic door security system, determine the combined architecture model of the Squeeze and Exicitacion Residual Network (SE-ResNet) to complete hand code calcification and determine techniques to improve hand code classification performance with the Squeeze and Exicitacion Residual Network (SE-ResNet) block model. The research was conducted by creating a comparison scenario of Convolutional Neural Network algorithm without SE-ResNet block and with the addition of SE-ResNet block.

Based on model training, the Convolutional Neural Network scenario with additional SE-ResNet blocks performs better than without additional SE-ResNet blocks. The scenario with additional SE-ResNet blocks on the hand code dataset with binary type segregation (black and white) reached 95.85%, and the validation accuracy reached 95.31%, and the designed model was able to predict 42 new data images.

Keywords*: Hand Gesture Recognition*, *Convolutional Neural Networks, Squeeze Exicitation Residual Network*

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