

BAB V

KESIMPULAN, IMPLIKASI, DAN REKOMENDASI

5.1 Kesimpulan

Berdasarkan penelitian yang telah dilakukan, didapatkan simpulan sebagai berikut:

1. Sistem *liveness detection* dikembangkan dari *library* Google Machine Learning Kit dengan metode *randomized challenge-response* berhasil diterapkan pada sistem kehadiran “My Attendance” berbasis *mobile cross-platform*. Berdasarkan *user feedback* pada **subbab 4.1.5**, dijelaskan ada beberapa aspek yang dapat ditingkatkan dari sistem yang telah dikembangkan pada penelitian ini.
2. Hasil pengujian untuk sistem *liveness detection* dan sistem kehadiran berbasis *mobile cross-platform* dilakukan dengan menggunakan pengujian *blackbox* berhasil memenuhi kebutuhan fungsional dan non-fungsional untuk pengguna baik mahasiswa dan dosen.
3. Sistem *liveness detection* berhasil mencegah dan meminimalisir terjadinya *face spoofing attack* pada proses kehadiran mahasiswa yang ditunjukkan dengan hasil evaluasi sistem menggunakan *performance metrics* menunjukkan tingkat *accuracy*, *precision*, *recall*, dan F-Score mencapai 100%.
4. Berdasarkan perhitungan *performance metrics* mengindikasikan bahwa sistem *liveness detection* memberikan pengaruh positif dalam mencegah terjadinya *face spoofing attack*, yang merupakan kerentanan pada sistem kehadiran dengan teknologi *face recognition*.
5. Adapun dalam proses pengujiannya mengalami beberapa tantangan dengan masih terdapat catatan percobaan kegagalan kehadiran pada skenario yang diharapkan untuk berhasil dengan rata-rata 28,5% yang berasal dari perhitungan percobaan kegagalan presensi di skenario I dan III yang disebabkan oleh partisipan yang tidak dapat menyelesaikan tantangan yang diberikan sistem.

5.2 Implikasi

Implikasi dari penelitian ini yaitu sistem *liveness detection* yang dibangun dengan pustaka Google Machine Learning Kit diimplementasikan pada sistem kehadiran berbasis *mobile cross-platform* untuk meningkatkan keamanan saat melakukan kehadiran pada suatu kelas perkuliahan. Tujuannya agar mencegah serta meminimalisir terjadinya kejahatan *face spoofing attack* yang mengancam sistem kehadiran yang dilengkapi dengan teknologi *face recognition* sebagai verifikasi identitas dari objek yang sedang melakukan proses kehadiran.

5.3 Rekomendasi

Berdasarkan proses dan hasil penelitian yang telah dilakukan, berikut adalah rekomendasi terhadap penelitian selanjutnya, sebagai berikut:

1. Menambahkan fitur pendeteksi lokasi berbasis GPS agar peran dosen lebih dapat mengetahui dimana mahasiswa melakukan presensi pada kelas perkuliahan yang sedang dibuka.
2. Pengembangan dan analisis lebih lanjut terkait antarmuka dan pengalaman pengguna saat menggunakan sistem *liveness detection* maupun sistem kehadiran berbasis *mobile cross-platform*.
3. Pengembangan lebih lanjut pada sistem *liveness detection* berdasarkan masukan pada **subbab 4.1.5**
4. Pengembangan dan analisis lebih lanjut terkait teknologi *face recognition* yang digunakan pada sistem kehadiran.

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