ABSTRAK

Penelitian ini membahas penerapan logika fuzzy untuk *Dynamic Difficulty Adjustment* (DDA) pada game top-down berbasis Android menggunakan game engine Godot. Permasalahan yang diangkat adalah perlunya mekanisme penyesuaian tingkat kesulitan secara dinamis agar pengalaman bermain tetap seimbang sesuai kemampuan pemain. Penelitian ini membandingkan tiga Sistem Inferensi Fuzzy, yaitu Mamdani, Sugeno, dan Tsukamoto, dalam melakukan estimasi skor permainan berdasarkan parameter waktu, Health Point (HP), dan jumlah musuh. Proses pengembangan game dilakukan dengan metode Multimedia Development Life Cycle (MDLC), sementara evaluasi performa sistem dilakukan menggunakan metrik MAPE dengan total 125 ronde permainan. Hasil penelitian menunjukkan bahwa metode Fuzzy Sugeno menghasilkan tingkat kesalahan terendah dengan MAPE sebesar 3%, sehingga paling sesuai diterapkan dalam sistem DDA untuk menjaga keseimbangan tingkat kesulitan permainan. Temuan ini diharapkan dapat menjadi kontribusi dalam pengembangan game adaptif serta landasan bagi penelitian lanjutan.

Kata Kunci: *Dynamic Difficulty Adjustment*, *Game*, Logika Fuzzy, Mamdani, Sugeno, Tsukamoto

ABSTRACT

This research presents the implementation of fuzzy logic for Dynamic Difficulty Adjustment (DDA) in a top-down Android-based game developed using the Godot engine. The main problem addressed is the need for a dynamic difficulty adjustment mechanism to balance the gaming experience according to player performance. This study compares three Fuzzy Inference Systems—Mamdani, Sugeno, and Tsukamoto—in estimating game scores based on parameters of time, Health Points (HP), and the number of enemies. The game development process followed the Multimedia Development Life Cycle (MDLC) method, while system performance was evaluated using MAPE metrics with a total of 120 gameplay rounds. The results indicate that the Fuzzy Sugeno method achieved the lowest error rate, with a MAPE of 3%, making it the most suitable approach for implementing DDA to maintain balanced game difficulty. These findings are expected to contribute to adaptive game development and provide a foundation for further research.

Keyword: *Dynamic Difficulty Adjustment, Fuzzy Logic, Game, Mamdani, Sugeno, Tsukamoto*