

**PENGEMBANGAN *GAME* EDUKASI
UNTUK PENGENALAN MUSIK TRADISIONAL
DENGAN DUKUNGAN VALIDASI SOAL BERBASIS CONVLSTM**

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ABSTRAK

Menurunnya minat generasi muda terhadap musik tradisional Indonesia melatarbelakangi penelitian ini. Tujuan dari penelitian ini adalah (1) merancang dan membangun game edukasi “Harmoni Nusantara” untuk pengenalan gamelan Bali; (2) mengimplementasikan algoritma *Convolutional Long Short-Term Memory* (ConvLSTM) untuk klasifikasi audio guna mendukung validasi soal otomatis; dan (3) mengevaluasi kualitas serta *usability* game. Jenis penelitian yang digunakan adalah *Research and Development* (R&D) dengan memanfaatkan Metode Agile. Game dikembangkan menggunakan Unity dan model ConvLSTM dilatih menggunakan *dataset* dengan variasi panjang audio (10 dan 20 detik) untuk mengklasifikasikan lima jenis gamelan Bali, didukung aplikasi web Streamlit untuk validasi soal. Hasil penelitian menunjukkan bahwa game edukasi “Harmoni Nusantara” berhasil dibangun sesuai rancangan fungsional. Implementasi model *Convolutional Long Short-Term Memory* (ConvLSTM) untuk klasifikasi audio gamelan Bali, yang memanfaatkan kombinasi fitur MFCC, Chroma, dan Spectral Contrast, menunjukkan performa terbaik pada dataset dengan segmen audio 10 detik, mencapai akurasi validasi sebesar 75%. Model ini menjadi inti dari sistem pendukung validasi soal yang diimplementasikan pada aplikasi web terpisah. Pengujian kelayakan media oleh ahli, menggunakan kerangka ISO 9241-11, menyimpulkan aplikasi game (88%) dan web (91%) “Sangat Layak”. Validitas konten yang diukur dengan Formula Gregory menunjukkan kesepakatan ahli yang sempurna ($V=1.00$). Pengujian *usability* melalui *User Experience Questionnaire* (UEQ) terhadap 30 responden menghasilkan skor “Excellent” pada semua aspek utama. Disimpulkan bahwa “Harmoni Nusantara” adalah media pembelajaran yang valid dan fungsional, di mana penerapan ConvLSTM terbukti efektif sebagai teknologi pendukung dalam proses pembuatan konten edukasi audio yang kompleks.

Kata Kunci: Game Edukasi, Gamelan Bali, ConvLSTM, Klasifikasi Audio.

**EDUCATIONAL GAME DEVELOPMENT
FOR THE INTRODUCTION OF TRADITIONAL MUSIC
WITH CONVLSTM-BASED QUESTION VALIDATION SUPPORT**

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ABSTRACT

The declining interest of the younger generation in Indonesian traditional music is the background of this research. The objectives of this research are (1) to design and build an educational game “Harmoni Nusantara” for the introduction of Balinese gamelan; (2) to implement Convolutional Long Short-Term Memory (ConvLSTM) algorithm for audio classification to support automatic question validation; and (3) to evaluate the quality and usability of the game. The type of research used is Research and Development (R&D) by utilizing the Agile Method. The game was developed using Unity and the ConvLSTM model was trained using a dataset with variations in audio length (10 and 20 seconds) to classify four types of Balinese gamelan, supported by the Streamlit web application for question validation. Testing includes media test (Unity Test Framework & Playwright), content validity test by experts (Georgy Formula), and usability test (User Experience Questionnaire/UEQ) on 30 respondents. The results showed that the game “Harmoni Nusantara” was successfully developed according to the design. The best ConvLSTM model, obtained from training using a 10-second audio dataset, achieved 75% accuracy in audio classification, supporting question validation. The web application successfully facilitated this process. Media and content expert testing revealed the game and web to be valid and usable in terms of content, functionality and medium. UEQ testing showed “Excellent” user experience on Pragmatic Quality, Hedonic Quality, and Overall aspects. It is concluded that “Harmoni Nusantara” with ConvLSTM-based question validation is a valid, functional, and well-received traditional music learning media, potentially as an alternative to cultural preservation.

Keywords: Educational Game, Balinese Gamelan, ConvLSTM, Audio Classification.