

INTISARI

Otomasi antarmuka adaptif saat ini memicu masalah *control gap* akibat model *black-box* AI serta *understanding gap* karena pengabaian profil kualitatif pengguna. Penelitian tesis berjudul Personalisasi Antarmuka Adaptif Menggunakan *Random Forest* dan Kerangka Kerja *Explainable Human-in-the-Loop* ini bertujuan untuk mengatasi masalah tersebut dengan memprediksi *Layout Preference* secara dinamis dengan tetap mempertahankan kontrol pengguna. Batasan variabel difokuskan pada metrik perilaku interaksi dan profil *Digital Persona*, sedangkan metode analisis data menggunakan pendekatan kuantitatif eksperimental yang membandingkan performa klasifikasi algoritma utama *Random Forest* (RF) dengan *Deep Neural Networks* (DNN).

Eksperimen komputasi divalidasi menggunakan skema *Stratified k-Fold Cross-Validation* dengan lima lipatan. Hasil pengujian empiris membuktikan model usulan *Random Forest* mengungguli arsitektur DNN, dengan capaian akurasi sebesar 87,25% berbanding 71,00%. Pembahasan menggunakan skor *Mutual Information* dan nilai kontribusi marginal *SHAP TreeExplainer* mengungkap bahwa tipe persona *Minimalist* dan metrik *Click Rate* bertindak sebagai fitur prediktor yang paling dominan secara global maupun lokal dalam memengaruhi keputusan klasifikasi rekomendasi tata letak visual.

Kesimpulan penelitian membuktikan bahwa integrasi penjelasan cerdas SHAP ke dalam kerangka kerja *Explainable Human-in-the-Loop* (X-HITL) melalui *prototype* antarmuka konseptual dengan tombol setuju, tolak, dan jelaskan secara teoretis sukses memenuhi standar usabilitas ISO 9241-11. Implementasi ini berhasil mempertahankan manusia sebagai pengambil keputusan akhir dalam siklus otomasi sistem adaptif, sekaligus efektif mereduksi beban kognitif pengguna tanpa mendegradasi kebebasan kontrol mereka.

Kata kunci: Antarmuka Adaptif, *Random Forest*, *Explainable Human-in-the-Loop* (X-HITL), *SHAP*, Usabilitas.

ABSTRACT

Adaptive interface automation currently triggers control gap issues due to black-box AI models and understanding gaps due to the negligence of qualitative user profiles. This thesis research, entitled “Adaptive Interface Personalization Using Random Forest and an Explainable Human-in-the-Loop Framework”, aims to resolve these issues by dynamically predicting Layout Preference while preserving users' control. The variable boundary is focused on interaction behavior metrics and Digital Persona profiles, whereas the data analysis method employs an experimental quantitative approach comparing the classification performance of the main Random Forest (RF) model against the Deep Neural Networks (DNN) model.

The computational experiments are validated using a five-fold Stratified k-Fold Cross-Validation scheme. The empirical results prove that the proposed Random Forest model outperforms the DNN architecture, achieving an accuracy of 87.25% compared to 71.00%. The discussion using Mutual Information scores and SHAP TreeExplainer marginal contributions reveals that the Minimalist persona type and the Click Rate metric act as the most globally and locally dominant predictive features in influencing visual layout recommendation decisions.

In conclusion, this study demonstrates that integrating SHAP intelligent explanations into the Explainable Human-in-the-Loop (X-HITL) framework through a conceptual interface prototype featuring accept, reject, and explain buttons theoretically meets the ISO 9241-11 usability standard. This implementation successfully maintains human positioning as the final decision-maker within the adaptive system's automation loop, while effectively reducing the user's cognitive workload without degrading their freedom of control.

Keywords: Adaptive Interface, Random Forest, Explainable Human-in-the-Loop (X-HITL), SHAP, Usability.