

ABSTRAK

Bahasa isyarat merupakan sarana komunikasi utama bagi penyandang tunarungu dan tunawicara, salah satunya Sistem Isyarat Bahasa Indonesia (SIBI) yang diakui secara resmi di Indonesia. Meskipun teknologi *computer vision* dan *deep learning* telah berkembang pesat, pemanfaatannya untuk media pembelajaran bahasa isyarat masih sangat terbatas. Penelitian ini menggunakan metode *Agile SCRUM* untuk pengembangan aplikasi web dan *Cross-Industry Standard Process for Data Mining (CRISP-DM)* untuk membangun model *machine learning*. Dataset citra gestur huruf dan angka SIBI dikumpulkan, diproses, dan dilatih menggunakan model *YOLOv8-cls*. Model kemudian diintegrasikan ke sistem berbasis *NestJS (backend)*, *React.js (frontend)*, dan *MongoDB (basis data)*. Solusi yang diusulkan adalah sistem pembelajaran SIBI berbasis web dengan fitur video pembelajaran, latihan gestur interaktif menggunakan kamera, kuis evaluasi, dan papan peringkat, yang mampu memberikan umpan balik langsung kepada pengguna berdasarkan hasil klasifikasi gestur. Hasil pengujian menunjukkan kinerja model yang tinggi, dengan *precision* dan *recall* sebesar 93,08%, *F1-Score* 93,06%, dan *Top-1 Accuracy* 90,27%. Temuan ini membuktikan bahwa integrasi teknologi *computer vision* dan *deep learning* menggunakan *YOLOv8* dapat menghasilkan media pembelajaran bahasa isyarat yang efektif, inklusif, dan mudah diakses secara daring.

Kata kunci: Bahasa Isyarat SIBI, YOLOv8, *Deep Learning*, Deteksi Gestur, dan Aplikasi Web.

ABSTRACT

Sign language is the primary means of communication for deaf and mute individuals, one of which is the Indonesian Sign Language System (SIBI) officially recognized in Indonesia. Although computer vision and deep learning technologies have developed rapidly, their use for sign language learning media is still very limited. This study uses the Agile SCRUM method for web application development and the Cross-Industry Standard Process for Data Mining (CRISP-DM) to build a machine learning model. A SIBI letter and number gesture image dataset is collected, processed, and drilled using the YOLOv8-cls model. The model is then integrated into a NestJS (backend), React.js (frontend), and MongoDB (database)-based system. The proposed solution is a web-based SIBI learning system with learning video features, interactive gesture exercises using a camera, evaluation quizzes, and a leaderboard, which is able to provide direct feedback to users based on gesture classification results. Test results demonstrated high model performance, with a precision and recall of 93.08%, an F1-Score of 93.06%, and a Top-1 Accuracy of 90.27%. These findings demonstrate that the integration of computer vision and deep learning technologies using YOLOv8 can produce effective, inclusive, and accessible sign language learning media.

Keywords: SIBI Sign Language, YOLOv8, Deep Learning, Gesture Detection, and Web Application.