

**PEMODELAN KLASIFIKASI MULTILABEL PADA
GAYA BELAJAR SISWA SEKOLAH DASAR DENGAN
*MACHINE LEARNING***

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ABSTRAK

Pada penelitian ini, peneliti membangun sebuah model *Machine Learning* yang bertujuan untuk mengatasi permasalahan klasifikasi gaya belajar siswa sekolah dasar (SD) agar menjadi lebih efisien dan akurat. Jenis pendekatan model klasifikasi yang dibangun adalah Klasifikasi Multilabel sebanyak empat model dengan masing-masing algoritma berbeda meliputi *Decision Tree*, *K-Nearest Neighbors* (KNN), *Support Vector Machine* (SVM), dan *Multi-Layer Perceptron* (MLP). Dibangunnya sebanyak empat model berbeda memiliki tujuan agar dapat dilakukannya proses perbandingan untuk menemukan model dengan kemampuan terbaik untuk mengatasi masalah klasifikasi gaya belajar. Adapun metode *Classifier Chains* diimplementasikan untuk memberikan kemampuan pada algoritma yang tidak dapat secara langsung menangani permasalahan klasifikasi multilabel. Dataset yang digunakan dalam proses pelatihan dan pengujian model adalah *Data Set of Learning Style Preference* dari Mendeley Data. Pada saat proses pemisahan dataset menjadi bagian data pelatihan dan data pengujian, dibuat tiga bentuk ukuran data yang berbeda meliputi Data I:90% pelatihan 10% pengujian; Data II:80% pelatihan 20% pengujian; dan Data III:70% pelatihan 30% pengujian. Adapun pada bagian data pelatihan diterapkan teknik validasi silang yaitu *K-Fold Cross Validation* dengan nilai k sebesar 10-*fold* agar model dapat untuk divalidasi selama proses pelatihan berlangsung. Pada saat proses pengujian dilakukan, didapatkan hasil kinerja yang baik pada keempat model *machine learning* yang dibangun dengan model *Decision Tree* sebagai model terbaik memiliki kinerja *hamming loss* 0.014, *accuracy* 95%, *precision* 98%, *recall* 99%, dan *f1-score* 98% kemudian, diikuti oleh model MLP, SVM, dan KNN. Berdasarkan hasil kinerja tersebut, dapat disimpulkan bahwa model klasifikasi gaya belajar melalui *machine learning* yang telah berhasil dibangun memiliki kinerja yang baik dan stabil.

Kata kunci: *Machine Learning*, Gaya Belajar, Klasifikasi Multilabel, *Data Set of Learning Style Preference*, *Decision Tree*.

**MODELING MULTILABEL CLASSIFICATION ON
ELEMENTARY SCHOOL STUDENT LEARNING STYLES WITH
MACHINE LEARNING**

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ABSTRAK

In this study, the researcher built a Machine Learning model that aims to overcome the problem of classifying the learning styles of elementary school students to be more efficient and accurate. The type of classification model approach built is Multilabel Classification as many as four models with each different algorithm including Decision Tree, K-Nearest Neighbors (KNN), Support Vector Machine (SVM), and Multi-Layer Perceptron (MLP). The construction of four different models has the goal of being able to carry out a comparison process to find the model with the best ability to overcome the problem of learning style classification. The Classifier Chains method is implemented to provide capabilities to algorithms that cannot directly handle multilabel classification problems. The dataset used in the model training and testing process is the Data Set of Learning Style Preference from Mendeley Data. During the process of separating the dataset into training data and test data, three different forms of data sizes were created, including Data I: 90% training, 10% testing; Data II: 80% training 20% testing; and Data III: 70% training 30% testing. As for the training data, a cross-validation technique is applied, namely K-Fold Cross Validation with a k value of 10-fold so that the model can be validated during the training process. During the testing process, good performance results were obtained on the four machine learning models built with the Decision Tree model as the best model with performance hamming loss of 0.014, accuracy 95%, precision 98%, recall 99%, and f1-score of 98% then, followed by MLP, SVM, and KNN models. Based on the performance results, it can be concluded that the learning style classification model through machine learning that has been successfully built has good and stable performance.

Keywords: *Machine Learning, Learning Style, Multilabel Classification, Data Set of Learning Style Preference, Decision Tree.*