

## **FINANCIAL AID DECISION SUPPORT USING DECISION TREE ALGORITHM**

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**ABSTRACT** - This extended abstract presents a study on financial aid decision support using decision tree algorithm. The objectives of this research were to design a model by using decision tree algorithm for classification of financial aid decision, to develop a classification of financial aid decision system, and to evaluate the model by using Evaluation Metrics. A dataset of student profiles and financial aid records was used to accomplish these objectives. There was preprocessing done to the dataset. Then, a decision support system was built using the decision tree method. The decision tree algorithm's performance was measured by dividing the data into training and testing sets. Accuracy was evaluated as a performance metric and used to predict aid eligibility on the test set using the trained model. The results of this study demonstrate the performance of the financial aid decision support decision tree algorithm. The algorithm's capability to create accurate predictions was shown by the accuracy obtained on the test data. To speed up and enhance the efficiency and fairness of the financial aid decision-making process, this study highlights the significance of methods based on data. To improve the accuracy and precision of financial aid projections, future research can concentrate on improving the decision tree model, including extra features, and investigating alternative methods.

**Keywords:** Financial aid, decision tree algorithm, classification, preprocessing, accuracy.

### **1. INTRODUCTION**

Computer science and larger data sets are merged in the study of Artificial Intelligence (AI) to enable decision making. Supervised machine learning is defined by using labelled data sets to train algorithms to classify data or accurately predict outcomes (Delua, 2021). To accurately classify test data into distinct categories, classification uses an algorithm. Decision Tree is a supervised learning method that can be applied to classification and regression issues; however, it is most frequently used to solve classification issues. Classification is a process of categorizing a given set of data into classes; it can be performed on both structured and unstructured data. A categorization model will attempt to forecast the value of one or more outputs given one or more inputs. Labels that can be used on a dataset are outcomes. Classification from a modelling perspective needs a training dataset with numerous examples of inputs and outputs from which to study. Zakat is the third pillar of Islam and is compulsory for Muslims who meet all the requirements. Giving away money to the poor is said to purify yearly earnings that are over and above what is required to provide a person and their family with their essential needs (Liberto & Boyle, 2022). There is a related work title C4.5 Decision Tree Implementation in Sistem Informasi Zakat (SIZAKAT) written by Ananda with the issue where most of the management still follows traditional practices such as manually documenting each Zakat transaction in the books and was solved by Zakat Calculation Module findings from the test, outcomes of data classification in SiZakat utilizing the Weka and C4.5 algorithm (Ananda & Wibisono, 2014).

### **2. METHODOLOGY**

In this project, Agile methodology was being used which consist of six steps, Requirement Analysis, Data Preparation, Data Modelling, Development, Training & Testing and Model Evaluation. Requirements analysis is the initial stage in the research methodology model. At this stage, Gantt chart will be done to assist the flow of the project as a project planning. A literature review was made to learn more about the chosen topic by using the Google Scholar to find out articles, journals, and webpages about the related topic. In data preparation steps, the data related is basically the applicants background information which can be collected from Unit Zakat as the applicants will submit their data in the application form provided. The data cleaning was done by using Microsoft Excel by removing the duplicates rows, handling missing values, removing unwanted characters or spaces and data formatting. Next is implementing decision tree algorithm by using decision tree classifier in Google Colab for data modelling and providing few models such as Naive Bayes, kNN, and SVM. In the development steps, the python language is used to integrate the classification model into a web page in order to be able to reach the deliverables of classification for financial aid decision. In training and testing modelling, the data was split into training and testing sets using the `train_test_split` function from

the `sklearn.model_selection` module. The `train_test_split` function randomly divides the data into two subsets: one for training the model (`X_train` and `y_train`) and one for evaluating the model's performance (`X_test` and `y_test`). The split is performed based on the `X` (drop `BANTUANKEWANGAN`) and `y` (`CADANGAN`) arrays, with a specified `random_state` to ensure reproducibility. Lastly for model evaluation, the models were tested by using the evaluation metrics which consists of accuracy, precision, recall and confusion matrix.

### **3. RESULTS AND DISCUSSION**

In the end of this project, the staff of Unit Zakat could be able to handle Zakat distribution in simple way by input the information of applicants needed and the system will provide the staff a result on how much the applicant eligible to receive or does they not eligible to receive.

### **4. NOVELTY OF RESEARCH / PRODUCT**

The unique aspect of this project is the web-based system's ability to provide real-time decision support by letting administrators enter applicant data and immediately obtain forecasts of aid eligibility. The procedure of allocating financial aid is made more effective and timelier by this dynamic capability. It gives administrators a modern tool for determining eligibility, making wise choices, and attending to students' changing needs.

### **5. CONCLUSION**

This study concludes by emphasizing the value of implementing a decision tree algorithm to assist with financial aid decisions. Administrators can learn a lot about the variables affecting aid decisions by using the decision tree model's understanding. The accuracy and precision can be improved through further development of the decision tree model that will enable more accurate and fairer decision-making.

### **REFERENCES**

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