

UNIVERSITI TEKNOLOGI MARA

**RULE-BASED REASONING AND
CASE-BASED REASONING
TECHNIQUES FOR
JUVENILE DELINQUENCY
RECOMMENDATION
EXPERT SYSTEM**

HIDAYAH BINTI DANİYAL

Thesis submitted in fulfillment
of the requirements for the degree of
Master of Science


Faculty of Computer and Mathematical Sciences

September 2014

AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged or referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any other degree or qualification.

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Name of Student : Hidayah binti Daniyal
Student I.D. No. : 2010161709
Programme : Master of Science (CS780)
Faculty : Faculty of Computer and Mathematical Sciences
Thesis Title : Rule-based Reasoning and Case-based Reasoning Techniques
for Juvenile Delinquency Recommendation Expert System
Signature of Student : 
Date : September 2014

ABSTRACT

This study aims to research the rule-based reasoning (RBR) and case-based reasoning (CBR) techniques in recommending the most suitable court orders for juvenile delinquency cases. Recommending court orders for juvenile delinquencies cases is a complex procedure because probation officers need to make decision based on their experiences and manual data which are legal statutes and similar court cases before they are able to recommend the most suitable court orders. Without a reliable technique to access these data quickly and efficiently, probation officers often need more time to complete their works. This leads to backlog in juvenile cases trials. Therefore, the ability to extract the correct precedent cases and court orders correctly is critical in order to expedite the trials process. Therefore to solve the problem, the objectives for this research is formularised as identify and design a legal reasoning model using appropriate techniques, develop Juvenile Delinquency Recommendation System (JDRES) prototype and evaluate the legal reasoning model. To achieve the objectives, several activities were undertaken. The RBR technique is used to extract the court order rules, while CBR technique is used to retrieve precedent cases. Decision tree is a technique used in RBR to facilitate inferences of cases to court orders. Hamming and Manhattan techniques are used in CBR approach to measure the distance in similarity metric while k NN classification is used to classify previous cases accordingly. A legal reasoning model is designed by integrating both RBR and CBR techniques which allows court orders rules and precedent cases to be extracted and referenced. To verify and validate the model, a simulation model, Juvenile Delinquencies Recommendation Expert System (JDRES) was constructed and tested against the real procedure. The results showed that both the rules and similar previous cases extracted by the simulation model are 80% similar to the expert's selection. The similarities between the results from the model and the expert's selection indicate that both the RBR and CBR are appropriate techniques for constructing the legal reasoning model. There are two main contributions of this research. The first contribution is the legal reasoning model which uses RBR and CBR techniques to automate the legal reasoning procedure. The second contribution is the JDRES prototype that creates an opportunity for Malaysia juvenile legal system to automatically recommend the most suitable court orders and retrieve the most similar precedent cases.

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