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A Knowledge Engineering Model for Diabetes Prediction and Drug Recommendation

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ABSTRACT

Diabetes mellitus is a major chronic disease and a growing public health burden. Early prediction and timely selection of suitable medicines can reduce complications, but clinical decisions still depend heavily on individual expert judgement. Pure machine-learning models can predict risk from data, yet they often work as black boxes and do not clearly use medical guidelines, drug properties, or safety constraints. Knowledge engineering offers a better way because it represents expert knowledge in a structured form that a computer can use for transparent reasoning.

This research proposes a knowledge engineering model for two linked tasks: predicting diabetes and recommending appropriate drugs. The model will organise domain knowledge into a knowledge base covering patient profile, risk factors, laboratory findings such as fasting glucose and HbA1c, symptoms, comorbidities, drug classes, contraindications, side effects, and drug–drug interactions. Clinical guidelines and specialist knowledge will be converted into rules and ontology concepts. An inference engine will then use these rules to classify a patient as normal, pre-diabetic, or diabetic and to generate a ranked list of suitable medicines.

Patient data such as age, gender, BMI, family history, blood pressure, lifestyle habits, and lab results will be used as input. The prediction module will estimate diabetes risk, while the recommendation module will suggest drugs by matching patient condition with drug knowledge and safety rules. The system will also give reasons for each suggestion so that doctors can understand why a particular medicine is proposed or avoided.

The model will be implemented using ontology tools, rule languages, and a decision-support interface. Performance will be measured by prediction accuracy, precision, recall, and expert agreement on drug suggestions. The expected contribution is an explainable computer-science framework that supports early diabetes detection and safer, more personalised drug recommendation. The work is intended to help clinicians, especially in settings where specialist advice is limited.

Keywords: *Knowledge Engineering; Diabetes Prediction; Drug Recommendation; Clinical Decision Support.*