

UNIVERSITI TEKNOLOGI MARA

**DEVELOPING AN
INTELLIGENT FRAMEWORK
FOR DIETARY
RECOMMENDATION IN
DIABETIC NEUROPATHY
USING FUZZY TOPSIS AND
LINEAR PROGRAMMING**

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ABSTRACT

Diabetic Neuropathy (DN) is a prevalent and serious complication of diabetes mellitus, resulting in pain, numbness, and muscle weakness, especially in the hands and feet, and markedly diminishing patients' quality of life. The rising global incidence of DN underscores the critical necessity for efficient dietary management within its prevention and treatment protocols. Nevertheless, formulating a suitable diet for DN patients is difficult because it necessitates the equilibrium of various nutritional elements while maintaining optimal caloric intake. Most current methods for planning meals depend a lot on human judgment, which can take a lot of time, be subjective, and not always be the same. Therefore, this study aimed to develop an intelligent dietary decision-support system for diabetic neuropathy by integrating the Fuzzy Technique for Order Preference by Similarity to Ideal Solution and Linear Programming. In the current research, Fuzzy TOPSIS was used to assess and prioritize the top ten customized diet programs on the basis of nine major nutritional factors such as whole grains, vitamin B12, omega-3, alpha-lipoic acid, magnesium, antioxidants, and other key nutrients. Subsequently, Linear Programming was employed to optimise the top-ranked diet plans by minimising total caloric intake while satisfying all nutritional requirements. The outcome showed that the proposed integrated framework could produce a coherent, balanced, and nutritionally adequate diet plan. In summary, the proposed method provided a systematic and effective tool for assisting with dietary decisions and has the potential to assist healthcare professionals and nutritionists in improving metabolic control and quality of life in patients with diabetic neuropathy.