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EXTENDED ABSTRACT

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ENHANCING AI-DRIVEN PERSONALIZED EXERCISE AND NUTRITION PLANNING FOR ELDERLY THROUGH PROMPT REFINEMENT AND EXPERT CONSENSUS

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I. Introduction

This study aims to refine the NExGEN Prompt Generator–ChatGPT Framework for personalized exercise and nutrition planning tailored to Malaysia's elderly population using the Fuzzy Delphi Method [1]. Addressing gaps in AI-driven health interventions, the research focuses on enhancing prompt accuracy, scalability, and adaptability to meet elderly-specific health needs effectively.

II. Methods

A convenience sample of 18 elderly (>60 yrs old) Malaysians. A purposive sample of 21 experts was recruited to evaluate the NExGEN framework using a custom-designed questionnaire based on personalized nutrition and exercise constructs. The Fuzzy Delphi Method was employed for consensus-building, with responses analyzed using Triangular Fuzzy Numbers and defuzzification techniques to assess expert agreement [2]. Expert feedback, collected through Likert scales and open-ended responses, informed iterative framework improvements.

III. Results and Discussion

A. Results Analysis on Experts' Views via Fuzzy Delphi

Experts rated the NExGEN framework highly, with all criteria exceeding 75% consensus and meeting thresholds ($d < 0.2$, α-cut > 0.5) [3]. Key improvements included specialized, user-centric prompts for personalized weight management, enhancing AI precision and practicality. Constructs like physical activity metrics, technology integration, and tracking systems achieved over 90% agreement. Defuzzification confirmed the relevance of all elements, ensuring the framework's robustness and expert-aligned customization (Table 1).

B. Prompt Analysis and Systematic Refinement Process

Using the Fuzzy Delphi method has optimized NExGEN-ChatGPT prompts for personalized exercise and nutrition planning in elderly. Aligned with expert consensus, these refined prompts transform broad questions into focused, user-centric queries that yield precise, actionable AI responses. This personalization, seamlessly integrated into elderly' exercise activities and dietary preferences, delivers practical guidance that boosts engagement and aligns with scientifically grounded recommendations.

Applying the Fuzzy Delphi method has significantly improved the NExGEN Prompt Generation Framework, strengthening personalized AI-driven dietary and physical training recommendations for elderly.

TABLE I
Summary of NExGEN-ChatGPT Fuzzy Delphi Analysis and Refinement

Element	Initial Prompt	Sample Refined Prompt	Change Justification
Desired Outcome	"Set a fitness or health goal."	"Improve cardiovascular health, increase muscle strength, or enhance mobility tailored to elderly needs."	67% ± 9%
Target Changes	"Decide on your weight loss or fitness target."	"Aim to reduce 6 kg or <5% of current weight based on health conditions, or not applicable if unsuitable."	69% ± 10%
Timeline	"Choose a time frame to achieve your goals."	"Set a timeline of 3 months, 6 months, or 1 year based on personal capacity and health status."	71% ± 7%
Start Date	"Pick a start date for your program."	"Commence the exercise and dietary program on 15/01/2024."	75% ± 8%
Flexibility in Progress	"Adjust your plans if things change."	"Indicate willingness to adjust your timeline if progress is slower or faster than expected (Yes/No)."	77% ± 9%
Motivation	"State your reason for pursuing this goal."	"Focus on improving health, enhancing appearance, or following a doctor's recommendation."	77% ± 5%

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IV. Conclusions

The refined NExGEN framework demonstrates high expert consensus and effectiveness in personalized exercise and nutrition planning for elderly. Improved user-centric prompts and robust Fuzzy Delphi-based validation ensure precision, practicality, and broad applicability, establishing the framework as a scalable, cost-effective alternative to traditional personalized coaching models.

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References

[1] Lim, S. L., Tan, K. M., & Ng, P. L. (2024). Enhancing Elderly Health in Malaysia through AI-Personalized Exercise and Nutrition Plans. International Journal of Environmental Research and Public Health, 21(2), 456.

[2] Habibi, A., Jahantigh, F. F., & Sarafrazi, A. (2015). Fuzzy Delphi Technique for Forecasting and Screening Items. Asian Journal of Research in Business Economics and Management, 5(2), 130–143.

[3] Krewski, D., Westphal, M., Al-Zoughool, M., Croteau, M. C., & Andersen, M. E. (2014). A framework for the next generation of risk science. Environmental Health Perspectives, 122(8), 796–805