Personalized Exercise Programs for Smart Fitness Systems: Scenario Design and Logic Development

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***Abstract*— This study developed a workout recommendation system and established a data-driven framework to enhance the user experience in smart fitness systems. To align the exercise recommendation algorithm with user goals, a fitness level assessment was developed, incorporating exercise experience, fitness test levels, and user workout tendencies. Additionally, the total number of workouts was determined based on the target period and workout frequency. Workouts were categorized by type, stage, difficulty, location, and equipment to refine recommendations. A logic system optimizes splits and tracks reps, sets, and rest to ensure balanced training. A feedback system analyzes performance data. To validate effectiveness, workout performance, user satisfaction, and recommendation precision are compared with existing programs.**

I. INTRODUCTION

As demand for personalized fitness grows, AI-driven systems are evolving to optimize workouts, tailor training, and improve outcomes [1]. However, the current smart fitness systems rely on static approaches, lacking real-time feedback and personalized adjustments. This study proposes a data-driven framework that integrates data analysis, exercise recommendation algorithms, and a feedback system to enhance workout accuracy and improve the user experience in smart fitness systems.

II. METHODS

This study designed a scenario for personalized workout programs using user profiling, incorporating age, gender, height, and weight. A fitness level assessment, considering experience, fitness test levels, and workout tendencies, was developed to refine recommendations. Workouts were categorized by types, stages, difficulty levels, locations, and equipment options.

III. RESULTS

Based on workout goals, fitness levels, and total workout sessions, recommended workout splits and muscle group-specific logic were developed. Additionally, a logic system was implemented to provide information on repetitions, sets, movement count, and rest time for each workout program. To ensure varied and balanced training, exercises targeting specific muscle groups were randomly assigned according to the workout split. A feedback system was designed using workout performance data, including:

1. **Basic feedback** - duration, difficulty, and progress.
2. **Physiological feedback** - heart rate and energy expenditure.
3. **Goal-specific feedback** - muscle targets and stimulation.
4. **Optimal feedback timing** - logic for when and how feedback is given.

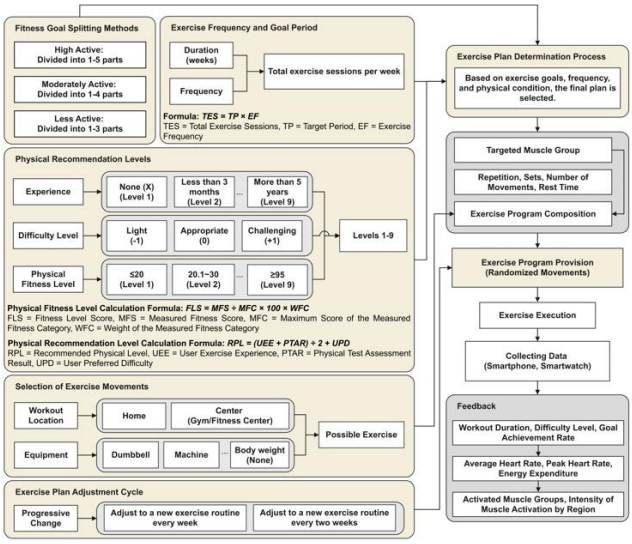


Figure 1. Developed Logic Tree for Personalized Smart Fitness Program.

IV. DISCUSSION & CONCLUSION

To validate effectiveness, a comparative evaluation is needed, assessing performance improvements, user satisfaction, and recommendation precision. Given the limitations of rule-based systems, enhancements should leverage user data, AI-driven personalization, and real-time feedback integration.

REFERENCES

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