

# FUZZIFIED SCORING OF THE FUNCTIONAL ASSESSMENT INSTRUMENT

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## **ABSTRACT**

This thesis describes the application of fuzzy logic to the Short Physical Performance Battery (SPPB) test, a series of timed physical activities that have been created to evaluate, physical functional performance for both research and clinical purposes, primarily for physically impaired older adults. The original scoring system of the SPPB test uses crisp time boundaries to assign the subject to discrete classes of performance. The crisp nature of the crisp thresholds can easily produce anomalies. Fuzzy Logic theory allows the natural description, in linguistic terms, of input/output relationships rather than relying on precise numerical threshold values. This advantage, dealing with complicated systems in a simple way, is the main reason why fuzzy logic theory is widely applied. This thesis offers a new approach for scoring the SPPB test. It demonstrates that in the proposed system, the Fuzzy Short Physical Performance Battery (FSPPB), the sensitivity and data distribution of the scoring system for the SPPB test can be improved. This thesis presents the procedures of constructing a fuzzy inference system using fuzzy logic to score the SPPB test. It also presents the procedures of constructing a fuzzy inference system using Adaptive Neuro-Fuzzy Inference System (ANFIS) technology and a tuning system for the fuzzy SPPB test using Particle Swarm Optimization (PSO). As part of a large project in technology for Eldercare, the goal is to accurately measure trends in physical performance of seniors over time.