ABSTRACT

Information security has become increasingly important in the digital era, especially for text data commonly transmitted over open networks. Text steganography offers a solution by concealing secret messages within documents in a way that is difficult to detect. However, the Unispach method, despite its high data hiding capacity, still suffers from security weaknesses due to its predictable embedding patterns. To address this issue, this study integrates the Unispach method with fuzzy logic to enhance the complexity and robustness of text steganography. The system is designed to analyze the structure of Microsoft Word documents by calculating whitespace density and spacing, then determining optimal embedding locations using a Mamdani type fuzzy system with trapezoidal membership functions. Invisible Unicode characters are embedded into selected positions based on their fuzzy priority scores. Experiments were conducted using various document lengths and message sizes, and the results were compared with the pure Unispach method. Findings show that the combined system achieved a message resilience rate of up to 93% under optimal conditions while maintaining efficient embedding and extraction times. This research contributes to improving the security of text steganography through an adaptive approach to selecting embedding locations.

Keywords: ***text steganography, unispach, fuzzy logic, data security, unicode, whitespace***