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OPTIMIZED FUZZY LOGIC-BASED FIRE MONITORING IN UNDERGROUND COAL MINES: BINARY PARTICLE SWARM OPTIMIZATION APPROACH

ABSTRACT

Underground coal mines are susceptible to many kinds of hazards. Mine fire is one of the most vulnerable threats that lead to loss of human lives and other resources inside the mines. Hence, continuous monitoring of underground coal mines is very important for early detection of mine fire. Nowadays, wireless sensor networks are being widely used for monitoring underground coal mines. However, the collected data from sensor nodes are inaccurate in nature, and there is a need for analyzing such data for taking preventive measure. In this project propose, an optimized fuzzy logic based fire monitoring system for wireless underground sensor network, which strengthens reliability of making decision in preventing mine fire. However, storing of large fuzzy rule set in the memory constraint sensor nodes and their traversal for every sensor reading are very challenging. Therefore, we use the binary particle swarm optimization (BPSO) algorithm to optimize the proposed fuzzy system that eliminates redundant rules but preserves event detection accuracy of the monitoring system. The proposed system is simulated using BPSO algorithm and Fuzzy Logic Toolbox inbuilt in the MATLAB. The simulation results demonstrate that the proposed system outperforms the existing monitoring systems for underground coal mines.