Predicting Fire Outbreak Caused by Electrical Faults using Artificial Bee Colony Algorithm

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Abstract

In Nigeria, there have been increases in damages due to fire outbreaks particularly in industrial and busy environments. Fire outbreak has caused serious injuries to people, loss of lives, damage of properties etc. Methods usually used in predicting fire outbreaks are fire alarm, flame detection, smoke detection algorithm, real-time fire, flame detection etc. This Research work introduces an artificial bee colony heuristic for predicting fire outbreaks in industrial environment in Nigeria. The artificial bee colony heuristic is a swarm-based heuristic, which mimics the foraging behavior of a honey bee swarm. In this paper, artificial bee colony technique was used for predicting fire outbreaks caused by electrical faults. Two Experiments were conducted, the first Experiment (Exp. 1) using 26 different test simulations was performed using different fault resistance, a constant colony size of 20 (area of search) and max Cycles of 5 (maximum number of iteration). It shows that when the fault resistance is between 0.3 ohms - 0.0 ohms, there will be likelihood of danger occurring among all faults at the same time, and none of the faults will be normal. While the second Experiment (Exp. 2) conducted, using 26 different test simulations was performed using different fault resistance, a constant colony size of 100 (area
of search) and max Cycles of 50 (maximum number of iteration), it proves that when the fault resistance is between 0.4 ohms - 0.0 ohms, there will be likelihood of danger occurring among all faults at the same time. The results also prove good performance of the predictive ABC system for average convergence at 2.25 at 26 trials and its unique capability to make multiple predictions. The system was simulated and modeled using Matlab 7.5.0(R2007b) program.

References


Index Terms

Computer Science

Algorithms

Keywords

Artificial bee colony, fire outbreaks, swarm-based heuristic, fault resistance, colony size and max cycles.