ARTIFICIAL BEE COLONY (ABC) TRAINED ARTIFICIAL NEURAL NETWORK (ANN) TO DIAGNOSE FAILURES IN LINEAR ANTENNA ARRAY

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ABSTRACT

The field of antenna is vital, since 60 years of age of antenna technology which has been an essential associate of communication area. Antenna arrays are getting main component in many applications like radar, satellite and mobile networks because of their good gain capability. To achieve considerable gain and directivity, antenna system must have elements in huge quantity; thus, there always remain a chance of the occurrence of failure of single or more of these elements in such a long array which makes major beam un tolerable disturbed and also its SLL which apparently becomes high and origin undesirable pattern disorder. By the faulted elements been diagnosed in the array, the radiation pattern can be regained by amending their sourcing division. Traditionally many efficient techniques and algorithms have been designed for this problem for fault detection using MATLAB and other antenna designing software. In this thesis, a very new and efficient technique named ANN-ABC (Artificial Bee Colony Hybrid Artificial Neural Network) has been developed to detect failures in an array. Development of this technique not only just detected the faults like other traditional techniques, but also the accuracy with which it gave results is very beneficial. For the performance assessment of the proposed technique (ANN-ABC) has been developed using the discrete event simulator OPNET Modeler 14.5. Simulation scenarios have been created for ABC technique as well as ANN-ABC technique. Many previous techniques are compared with proposed technique. The fault detection achieved through ANN-ABC is better other previous techniques. Developed technique can be used at the service stations to detect the locations of the faulty elements. Most precisely it can be said that desired benefits of proposed technique can be obtained for real life problems involving very large arrays with possible large combinations of failed elements in an array. From the results of the simulation we observe that it could detect 8 faults in an array. Detection done by ANN-ABC is near about 50%, though 16 elements array is taken in which 8 faulty elements could get detected in proper time. The time required for simulation of both proposed technique and the traditional techniques may be same that is about 15 minutes but the number of faults detection and the accuracy in the results graph is excellent. In present work, a technique is developed for linear array but same could be replicated to any planar array comprises any number of antenna elements. Developed technique can be made more efficient to get 100% detection of faults. In future, this scenario and array radiation pattern can be partially failed and detection of partial failures can be done if OPNET will be interfaced with MATLAB to synthesis antenna array.