

# Radar Pattern Classification Based on Class Probability Output Networks

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**Abstract.** In modern days, most of aircraft and ships are equipped with radar emitting specific patterns of electromagnetic signals. Then, radar antennas are capturing these patterns which are required to classify the type of emitters. A conventional way of emitter classification is to categorize the radar patterns according to the sequences of frequencies, time of arrivals, and pulse widths of emitting signals by a human expert. In this respect, this paper propose a method of classifying the radar patterns automatically using the network of calculating the p-values of testing hypotheses of the types of emitters referred to as the class probability output network (CPON). Through the simulation for radar pattern classification, the effectiveness of the proposed approach has been demonstrated.

**Keywords:** radar pattern, classification, one class, class probability, Beta distribution

## 1 Introduction

- radar pattern classification problem
  - difficulty of categorization
  - previous works
  - CPON method
  - effectiveness

The rest of this paper is organized as follows: in section 2, the problem of radar classification is described, section 3 presents the method of radar pattern classification using the CPON, section 4 shows simulation results for radar pattern classification, and finally, section 6 presents the conclusion.

## **2 Radar Pattern Classification**

### **3 Class Probability Output Networks**

## 4 Simulation

To demonstrate the effectiveness of the proposed method, the simulation for radar pattern classification was performed for the radar data ...

- radar data
- classification method
- evaluation criteria: accuracy, precision, recall, F-measure
- simulation results
- analysis of simulation results

## 5 Conclusion

A new method of radar pattern classification was proposed based on the class probability output network (CPON). In the proposed method, statistical features of radar patterns such as the mean, variance, skewness, and kurtosis are extracted and used as the input to the CPON. Then, the CPON is used to construct a hypothesis of specific emitter from the distributions of these features. As a result, the CPONs provide the p-values of testing hypotheses of the types of emitters. Through the simulation for radar pattern classification, it has been demonstrated that the proposed method is comparable with (or better than) an human expert.

## References

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