Applying Learning Classifier Systems to Acoustic Scene Classification: DCASE 2017 Challenge

CITS4404 Artificial Intelligence & Adaptive Systems Team Project

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Abstract

This will be our abstract
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1 Introduction

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2 Background

This section provides a brief review of learning classifier systems (2.1), the DCASE Challenge (2.2) and acoustic scene classification (2.3).

2.1 Learning Classifier Systems

First introduced in the mid-1970s, Learning Classifier Systems (LCSs) are a form of machine leaning algorithm with a unique combination of learning mechanisms [9]. The core of a LCS is a population of rules, or *classifiers*, which collectively form the solution to the given problem [5]. This population of rules is gradually evolved toward an optimal and *optimally general* set through a number of processes within the LCS [5].

The motivation for this structure is that, when modelling and attempting to predict the outcome of complex systems, a desirable approach is to develop a distributed population

of classifiers – or rules – that together form an accurate model [5, p. 2]. Each classifier, then, spans a subspace of the problem (often referred to as the 'environment') with the population spanning the entire problem.

Individual classifiers consist of a condition, an action and a number of parameters. The condition specifies the subspace of the problem, while the action proposes an outcome for this subspace. For a given *instance* of the problem, the classifiers then say: 'If the problem instance matches

XCS can be distinguished by the following key features: an accuracy based fitness, a niche GA (acting in the action set [A]), and an adaptation of standard Q-Learning as credit assignment.

population of rules applied to problem (environment) instances to make a prediction

evolved using a learning mechanism incorporating a number of mechanisms – GA, subsumption, deletion and covering

online vs reinforcement (key success area of LCS)

continuous vs discrete data

fitness: strength vs. accuracy

Common variants: MCS, XCS, XCSR

2.2 DCASE Challenge

what (sound recognition, machine listening), why (motivations) and how (mechanics of challenge)

baseline solution, best results

2.3 Acoustic Scene Classification

more detailed description of this particular task from the challenge

3 Experiments

blah

3.1 Modification of Existing Code

Is there a better title you'd suggest Scott?

Description of Ryan's code, how we modified it and the results obtained

3.2 Adapted XCS(R) Design

Details of the LCS we made, specific design changes relative to the standard implementation for our problem

4 Results

4.1 Environment Representations

Alternative feature processing investigated

4.2 Parameter Tuning

5 Discussion

6 Conclusion

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