Chapter 6

Autonomous Market Segments Estimation Using Density Conscious Artificial Immune System Learner

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ABSTRACT

Automated exploration of groups of customers to understand customer behavior from raw data is highly required to support strategic decision making given the pressure of competitive market. Several mathematical and statistical methods have been applied for autonomous model estimation from multivariate data. The current paper investigates employability of new generation of bio-inspired metaheuristic algorithms, named the artificial immune system (AIS), which in the current proposition, learn through density based kernels. As such the model simulates probabilistic behavior of the dendritic cells (DCs) during recognition of the antigens and danger signals, whose learning has been modeled with an infinite Gaussian mixture model. The unsupervised learning capability of the model has been found to be effective for multivariate data.

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Autonomous Market Segments Estimation

INTRODUCTION

Across the rapidly emerging applications of computational intelligence, development of methods and techniques to explore interesting information without having any prior knowledge about data characteristics has been of paramount concern. Market segmentation refers to the field of active research and practice wherein customer’s behavior is to be understood through computational models for digging out the hidden groups in the data collected though purchase entries or surveys for example. The problem thus narrows down to the task of segmentation of structured data. The problem is dealt with in detail with underlying issues and methods in this work. Modern clustering techniques have been developed vastly exploiting concepts from multiple disciplines, a comprehensive reading can be found in Jain (2009). The present chapter revisits earlier work (Pathak, Dhyani, & Mahanti, 2011) in which the AIS based learning model DCAIGMM was developed. The efficacy of the model has been investigated in comparison to contemporary autonomous segmentation model.

BACKGROUND

Market segmentation refers to the marketing strategy that seeks to divide a broad market perspective into subsets of consumers, locations, and businesses, in terms of common needs, interests, and priorities in a way to define their strategies to target potential customers. It is more so sought by small scale companies to optimize the cost to increase consumer penetration. The analysis covers a wide range including geographic segmentation, demographic segmentation, behavioral segmentation, psychographic segmentation, occasional segmentation, segmentation by benefits, emotive Segmentation, cultural segmentation, and multi-variable account segmentation. Computational tools have been proved of great help in the recent knowledge world, where accurate data analyses have been made possible due to huge amount of data about business operations being stored continuously. Several mathematical and statistical methods have been developed and successfully applied help the decision makers. Data mining and machine learning algorithms of wide range including the Decision Trees, Classification and Regression Trees, Rough Sets, Self organizing maps, Fuzzy inference engines, and vast range of bio-inspired algorithms have been reported in research literature (Prabha & Ilango, 2014; Mattila, 2008; Yao, 2013; Taylor, n.d.; Chulis, 2012); majority of which have been implemented in successful commercial tools for the task. The current work focuses on a bio-inspired algorithm based on natural immune system dynamics modeled using density based model estimation methods, applied to extracting segments from multivariate data.
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