DATABASE MARKETING PROCESS – AN ONTOLOGICAL APPROACH

Filipe Mota Pinto * and **Manuel Filipe Santos** **

* Polytechnic Institute of Leiria /Computer Science Department, Leiria, Portugal
{fpinto}@estg.ipleiria.pt

** University of Minho / Systems Information Department, Guimarães, Portugal
mfs@dsi.uminho.pt

***Abstract*— In this work we use ontologies at an almost unexplored research area within the marketing discipline, throughout ontological approach to the database marketing. We propose a generic framework supported by ontologies for the knowledge extraction from marketing databases. Therefore this work has two purposes: to integrate ontological approach in Database Marketing and to propose domain ontology with a knowledge base that will enhance the entire process at both levels: marketing and knowledge extraction techniques.**

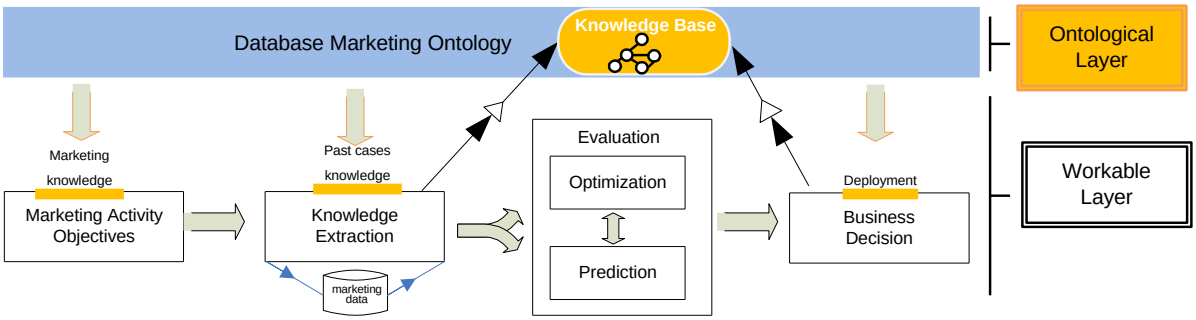
INTRODUCTION

Technology has provided marketers with huge amounts of data and artificial intelligence researchers with high level processing rate machines. At the marketing practice we note that marketing database is normally used in organizational secret and closed purpose, which limits the knowledge for reuse and sharing. Database Marketing (DBM) is a database oriented process that explores database information in order to support marketing activities and/or decisions. The Knowledge Discovery in Databases (KDD) process is well established amongst scientific community as a three phase process: data preparation, data mining and deployment/evaluation. The KDD has been successfully applied in various domains particularly in the marketing field. Nevertheless, previous well established concepts and scientific dominance regarding each one of these methods seem to have a lack of knowledge concerning its application amongst different requirements and conditions.

APPLIED ENGINEERING METHODOLOGY

Ontologies are becoming, nowadays, one of the most popular knowledge representation techniques. When ontologies are formalized in any kind of logic representation, they can also support inference mechanisms [4]. For a given collection of facts, these mechanisms can be used to derive new facts or check for consistency. Such computational aids are clearly useful for knowledge management, especially when dealing with complex and heterogeneous knowledge problems or with large amounts of knowledge. Ontologies, model the structure of data (e.g., representing sets of classes and their properties or attributes), the semantics of data (e.g., in the form of axioms that express constraints such as inheritance relationships, or constraints on properties), and data instances (often called individuals). Ontologies use a formal domain or knowledge representation, agreed by consensus and shared by an entire community[4]. To integrate ontologies, we must be able to understand the relationship between structures and data in different ontologies. The Database Marketing Ontology (DBMO) has been developed according two methodological principles (adapted from [3]:

i) *ontology domain double articulation*: this principle suggests that an ontology is doubly articulated into: domain axiomatization and application. To capture knowledge at the domain level, one should focus on characterizing the intended meaning of domain concepts. Through this articulation method, our work developed a cross-research between marketing concepts (objectives and activities) and knowledge extraction techniques, e.g., sentences that states the necessary and sufficient conditions for e.g., some algorithm condition development in terms *algorithm type definition*, *modeling objectives* and *data type required*.



ii) *Ontology modularization*: The modularization principle suggests that applications should be built in a modular approach. It combines all axioms introduced in the composed modules (here each module refers to database marketing process phase). According to this approach, modules will make the ontology maintenance and reuse easier.

According to the double principle the ontology has a knowledge axiom structure that reflects a structured marketing knowledge and also a structured database marketing knowledge. Hence, our approach has been developed at two strands: marketing knowledge and database oriented knowledge extraction process.

KNOWLEDGE BASE

A synergy between decision support systems and knowledge extraction process management is possible [1]. Ontologies can play an important role in this area, throughout domain knowledge and process management integration. Here we introduce the knowledge base role. This ontological layer is the main core of the system, whenever a new DBM process starts; it both suggests from previous related marketing knowledge and registers according taken options. The efficiency of the interaction between marketing objectives, marketing databases and knowledge extraction process is mainly based on the instantiation process at the knowledge base. In short, knowledge base holds all DBM related process, during the instantiation process by adding a new record. Each record in knowledge base refers each running database marketing process.

KNOWLEDGE BASE RECORD

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{     Marketing  objectives
      Marketing activity
      Data used (selection)
      Data preparation tasks
      Algorithms used
      Model description
      Analytical model evaluation
      Model optimization
      Business decision      }
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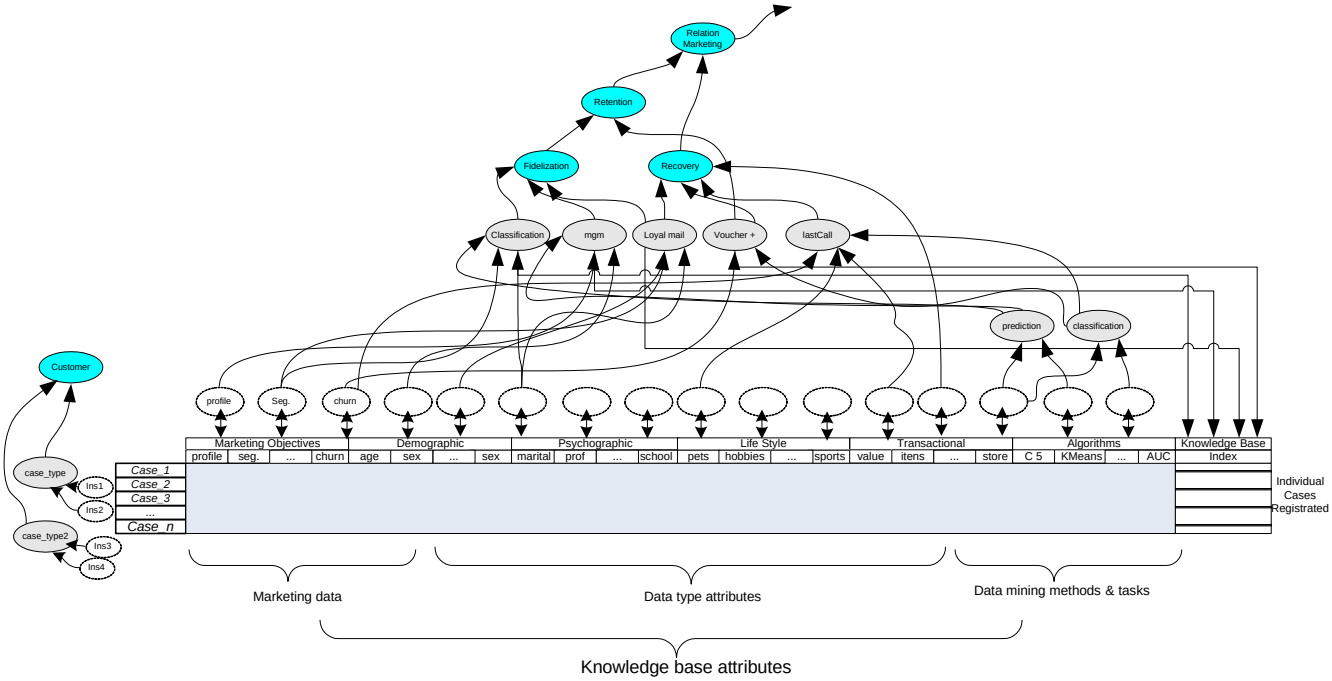
IMPLEMENTED SOLUTION

Our solution integrates formal (marketing field) and database extraction process (extraction process) knowledge. Indeed, our defines relations and constrains between input elements (e.g., data items, data or modeling tasks) and DBM outputs (models and related evaluation) through a knowledge base instantiation.



CONCLUSIONS

The extent, degree and simplicity of communication enabled by ontology makes it a synergistic component of DBM strategy. An ontological DBM approach solution appears promising for both marketers and computer scientists. One of the promising interests of DBM ontologies is its use for guiding the process of knowledge extraction from marketing databases. This idea seems to be much more realistic now that semantic web advances have given rise to common standards and technologies for expressing and sharing ontologies. In this way DBM can take advantage of domain knowledge embedded in DBMO addressing during the process the best related approach, through the knowledge base usage. Therefore, marketing domain is an interesting and challenging domain for representation and ontology development. Further research on this subject will be aimed in both ways, with the final task of comparing diversities between OWL and Frames ontology and showing their advantages and disadvantages for a subject domain.

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