Advantages of Artifical Intelligence in Electronic Commerce

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E-commerce is the most important process, which is used in the electronic business. E-commerce produces a lot of data and information, which has to be analysed. This contribution wants to show the possibilities of using artificial intelligence in e-commerce.

Introduction

Main meaning of electronic commerce is given by position in the field of electronic business. Electronic business is based on the electronization of processes in the form of internet or intranet applications.

Electronic shopping is rapidly increasing the way of business. Fundamental element of e-commerce is applications based on web technologies. This application allows the presenting and selling of goods and services to customers by internet network. The main advantage of e-commerce is unlimited virtual space for the presentation of goods. Only the physical inspection is not possible, but customers have a lot of other information about the item. E-commerce produces a lot of information, which has to be stored and analysed. In field of the data processing can be used artificial intelligence directly neural networks.

Application of artificial intelligence in electronic commerce

Following the development of electronic business a lot of information is collected. The goal of the right application of the electronic business is to produce and display information from stored data. This process is called data mining. The data mining process include selection, searching and modelling. These activities are based on particular data. The task of data mining is to prepare information for use in e-commerce.

Using the analyse of stored information, it is possible to make quicker and better decisions of e-commerce strategy. Good examples of using data mining

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can be found in the field of customer relationship, stock management, marketing analyses, products offers. The following text discusses using in three main parts.

Customer relationship

Customer relationship management is a very important part of electronic commerce. This part is useful for a lot of e-commerce companies. Use of data is based on stored path of customer in electronic shop. By following this path customers are divided into several groups. This division is important for the recommendation of the right products or links to individual customers.

Second example is the analyst of the shopping basket. To find the right answer to the question, what product the customer wants, is to find the relation between products in the basket. The right answer is important, because it allows the offering of the right product to the right customer. By using artificial intelligence it is possible to find links between products, which are not obvious at the first view.

Stock management

Forecast of the future development of sales is very important for two reasons. First of these it is important to make decision what customer will ask for in the future. Second reason is to know how the amount of items will develop. Distribution of parcels is important too. Customers have to know the price of packaging. . It means that it is necessary to know postage or transport fees. Neural network can help with optimization of cover size - e. g. by neural network it is possible to optimize box size by knowing the size of items. Forecasting of stock allows the optimization of the number of staff, inventory or preparing of the marketing campaign.

Marketing campaign

The electronic commerce is one of the most important marketing solutions, which can be used by companies. The study and analyse of customer habits (already mentioned above) belongs to the important goal of electronic commerce. Marketing campaigns can be formed by the application of neural networks to web server logs or other costumer data stored in the database. Objective of analyst is to prepare prototypes of customers.

Way of the implementation to Microsoft SQL Server 2005

Important role in the realization and for searching answers to questions of analyst of electronic business take analytical functions that are included in Microsoft SQL Server 2005. This database system is often used for electronic commerce applications. The extension for Microsoft SQL is called Data Mining. Data mining in Microsoft SQL follows the whole cycle of data flow in the electronic commerce. Data mining extension is used for building intelligent applications, which use all advantages of data mining process in all stages. The advantage of this data mining extension is the possibility of work in real-time (e.g. good example is validation of input by data mining algorithm output.)

Advantages of data mining in MS SQL consist in the integration with all parts of MS SQL. It means that data mining is not a standalone application, but is an integral part of all standard applications.

Data mining in MS SQL is useful for database programmers. They don't have to be experts in data mining. Working with data mining extension is quite easy. MS SQL data mining extension is based on a well - prepared API, which support call of models directly from user application. This is main reason why is very useful for electronic commerce system based on internet or intranet application. The data mining API is based on language, which is called Data MIning Extensions to SQL (DMX). The language DMX is based on basic SQL language syntax. This syntax is the same in the whole MS SQL Server.

Data mining in MS SQL is based on several different algorithms:

- Decision Trees – algorithm counts probability, based on values of training set

- Association Rules – algorithm based on bindings among elements.

- Naive Bayes – is used for showing difference in selected variable and for prediction.

- Sequence Clustering – is used for clustering data. Clustering is based on sequence of events.

- Time Series – is used for analyse and prediction based on time data.

- Neural Nets – most important part of artificial intelligence. Neural Nets are used for prediction or for searching connections in data, where connections are not clearly visible.

- Text Mining – is used for analyse non-structural text data.

Microsoft Neural Network Algorithm (MNNA) is most important part of the list for purpose of this contribution. This algorithm will be described next.

Microsoft Neural Network Algorithm

Microsoft Neural Network Algorithm is using multilayer Perceptron neural network for data mining model construction. Back-Propagated Delta Rule network, composed of up to three layers of neurons, or perceptrons. These layers are an input layer, an optional hidden layer, and an output layer. In a Multilayer Perceptron network, each neuron receives one or more inputs and produces one or more identical outputs. Each output is a simple non-linear function of the sum of the inputs to the neuron. Inputs only pass forward from nodes in the input layer to nodes in the hidden layer, and then finally they pass to the output layer; there are no connections between neurons within a layer.

Perceptron neural network

The neural network is based on biological principles of the neuron. The neuron is called an elementary part of the network . Neurons are connected to each other and inputs from other neurons are by weight.   All inputs are added and offset value is subtracted. Offset value dictate, which value makes the neuron active.

The first implementation of neural network was prepared by Frank Rosenblatt in 1957. This first neural network contains only one neuron. The neuron used sigmoid function for the activation function. It means that output of the neuron can be 1 or -1. The neuron is able to divide patterns only in two groups. The perceptron neural network (basic configuration) has a problem with linear separability. This makes it very sensitive for noise in data.

Back propagation Algorithm

Neural networks, that use this algorithm for back-propagated of error. Advantages are given by ability of approximation most of function.   The

algorithm calculates the error, if any, and adjusts the weights that are associated with the inputs for that neuron, working backward from output neurons to input neurons in a process known as back propagation. The algorithm then repeats the process over the entire set of training data.

The important problem is that network has to know optimal output for particular data.

How the Microsoft Neural Network Algorithm

The algorithm uses a three-layer network, which contain input layer, hidden layer and output layer. . Input neurons represent input to data mining model and state of individual attributes. Hidden neurons transport values from input layer to output layer. Output neurons represent output values for data mining models too.

Input neurons receive values from data mining model and output from other neurons. Each input neuron has weight - the size of weight is set by the importance of each input. The weight can be negative; it means that this neuron will be skipped. Each neuron has a simple non-linear function assigned to it, called the activation function, which describes the relevance or importance of a particular neuron to the layer of a neural network. Hidden neurons use a hyper tangent function for their activation function, whereas output neurons use a sigmoid function for their activation function. Both functions are nonlinear, continuous functions that allow the neural network to model nonlinear relationships between input and output neurons.   These two functions are non-linear, which allow them to solve problems, which are not linear-separability.

Conslusion

The aim of the contribution was to show the possibility of using artificial intelligence - neural networks in field of electronic commerce. Second point was to show implantation of neural networks in MS SQL Server data mining extensions. Basic of the implementation in MS SQL is the Microsoft Neural Network Algorithm. The algorithm is based on the multilayer Percepron neural network which used back propagation algorithm for error adjustment. Possibilities of using neural networks in electronic commerce are appreciable. The reason for that in electronic commerce is necessary to make prediction of future. Mainly in the relationship between shop and costumers.

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