A new agent approach for recognizing research trends in wearable systems☆

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ABSTRACT

In this article, a new agent approach has been proposed for recognizing the research trends in wearable systems. In addition, we have formulated a mathematical model to predict the agent development trends in the field of wearable systems. The proposed agent approach converts the raw documents found on the Internet into relevant information. To determine the key trends, we traced and analyzed the behavior of the agent development aspects using keywords over a long period. A prototype has been developed in order to search for multiple keywords at the same time and collect the required data automatically to eliminate the useless data. Subsequently, the required data is converted into usable information. The results showed that the research trends in wearable systems are divided into four zones: growing, slowing down, decreasing gradually, and quickly decreasing zones.

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1. Introduction

Currently, the information available online is growing rapidly, so the main challenge lies with the extraction of real volume of data in a specific field. The availability of diverse data files makes it easily accessible. The search engines have been designed to search for information on the Internet and FTP servers and use regularly updated indexes to operate efficiently [1]. A search engine is a program that searches documents for specified keywords and returns a list of documents containing those keywords. It allows one to search for content that meets specific criteria and subsequently, retrieves a list of files that matches those criteria [2]. When a query is submitted to a search engine, it examines its index and provides a set of best matching pages according to its criteria, with contains information about the documents that the user needs. The most popular search engines currently available are Google and Yahoo [1].

Data extraction is a promising way to deal with the research trends in wearable systems as it uses the web search tools. Such tools mine information accessible in the extensive databases or open catalogs [1]. This allows for new systems to gather the required information from the Internet. There are numerous ways utilized as a part of web search tools (such as web crawlers) to look for records taking into account the catch phrases or keywords related to a particular theme. In addition, a prototype system can be designed by combining the multi-apparatus settings with the exploration engines so as to utilize the gathered information from such search engines. These tools can review and break down the information for

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wearable systems research publications in any field of learning to perceive the difficulties confronting the wearable systems research areas.

The recent interest in the area of agent systems has resulted from the variety of literature on research disciplines and technologies, especially artificial intelligence (AI), object-oriented programming, human-computer interfaces, and networking [3].

The initial step works on some single agents, which started in the late 1980s and continued all through the 1990s to the present day, focusing on the investigation of agents with symbolic internal models. Such investigation deals with issues like arranging, information representation, analysis, and learning [2].

This paper shows an agent method that perceives the research patterns of wearable systems, taking into account the quantity of extracted information by utilizing the search engines. The method deals with the difficulties faced by the advancement of agents and agent research information. In this study, an agent is a computational framework that senses and acts self-sufficiently in a mind-boggling dynamic environment to fulfill an arrangement of objectives or undertakings for which it is composed [3]. The processing of gathered raw data into useful information is carried out using mathematical and statistical theories. A mathematical model is figured out in light of a few understood mathematical and statistical theories to anticipate the advancement of an agent. This method attempted to fit a curve to the number of searched data consistently. The organization of the data differed to a great degree, and in any case, we concentrated on archives in the PDF format that are considered to be the most well-known standards for document publishing.

Note that the real noisy data is analyzed and calculated from the collected data to minimize the noise effects. Thus, the proposed system was developed based on mathematical models for searching topics and the number of their PDF documents stored on the Internet. The method was evaluated on popular large databases (i.e., Google and Yahoo). In addition, we have traced and analyzed the behavior of the agent development aspects using multiple keywords over a long period of time to determine the key trends. By observing the curve of the number of searched data, the proposed method divides the research directions into several areas, such as the growing area, the slowing down area, the area that is decreasing gradually, and the decreasing quickly area. This study might help the beginner researchers to find the emerging and novel research topics across many disciplines.

Our work has been organized as follows. The related works are discussed in Section 2. In Section 3, the proposed method and the mathematical model have been described. Section 4 draws the prototype implementation of such solution. Sections 5 and 6 present the computation of noise level and the tracking agent for wearable systems research trends, respectively. Section 7 discusses the results, and finally, Section 8 concludes the paper indicating the possible future work.

2. Related work

With the quick advancement of the Internet and the constant increase of web data, incorporating web extraction innovation into conventional web search tools has been considered as one of the most imperative difficulties in the process of data extraction and computerized reasoning fields. While using the search engines, a greater part of the client's attention falls on the automatically searched results, and the other rich sources of data are given careful consideration, for example, the configuration of page (HTML, PDF, DOC, and so forth) or the number of results within the search engine [1–3].

Numerous studies have been proposed on web search extraction and the pattern of electronic web indexes [1, 2, 4–7, 13]. Existing methodologies in automatic web extraction can be grouped into three classifications: wrapper, automatic template generation and a hybrid approach [13]. Prior works in data extraction are primarily semi automatic or even manual [8–11], which requires human intervention to create extraction rules for site pages. Numerous new applications, for example, constructing large-scale meta-search engines [12], require completely automated wrapper generation procedures. However, the existing research work does not appear to provide a solution for using the resulted number of search queries to predict the development of research trends of the wearable systems in a particular field.

Compared to the existing methodologies and approaches, we accentuated on data extracted from the search engine and not on the search engine itself. We presented another method that identified the search results by looking through multiple catch phrases (or keywords) without any client connection and manual procedure.

3. Proposed method: model and design

The method described in this paper utilizes the search engines as a tool for information collection. The target results of the search process include the item numbers found in the predefined requirement searched by the search engine. This necessity is characterized as an arrangement of keywords and logical relations (e.g., "or", "and") among them and constraints on them. It should be noted that the items of collected data involve extensive experiments and predict the empirical formula for the phenomena under study. Every search engine has a certain set of rules that can be used to define the user requirements. Such method of data collection is different from others in preparing the questionnaires and conducting interviews. In this paper, the data is collected as follows:

1. Firstly, the keywords and their relation structure are characterized.
2. The use of these characterized keywords and relation structure in the selected search engine is highly encouraged. Then this search engine is executed to scan for the required assignment.