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CONTENTS

Mathematical and Natural Sciences
Multi-purpose Control Laws in Motion Control Systems
Mikhail N. Smirnov, Maria A. Smirnova, Tatyana E. Smirnova and Nikolay V. Smirnov 2265

Preservation Theorems Concerning Compactness in Generalized Topological Spaces
Samer Al Ghour and Abeer Al-Nimer 2273

Management and Social Sciences
Branding Halal and Future Prospects for the Medical Tourism Industry in Malaysia
Dr. Abdullah Sarwar and Prof. Dr. Murali Raman 2281

About Research of Features of Legal Culture on the Basis of Historical -Literary Heritage
Elnur L. Hasanov 2289

The Effects of the International Division of Labor on Manufacturing Industries' Upgrading of China based on Export Vertical Specialization
Bin Zhang, Keonhyeong Lee and Wence Yu 2297

Application of the Marketing Strategies Experience of Multinational Corporations to Modernize the Russian Industry
Ekaterina A. Degtereva, Veronika Y. Chemova and Boris A. Heyfets 2313

Artifacts as a Source of Russian and Kazakh Zoological Terms
Zifa Temirgazina, Uldanai Bakhtikireeva and Vlaidimir Sinyachkin 2325

Structural Relationships between Elementary School Teachers' Intercultural Sensitivity, Multicultural Acceptability, Learning Cultures, and Multicultural Teaching Competency
Jong-Hun Kang and JuSung Jun 2337

Moral Hazard Testing (Risk Transfer Behavior) in the Deposit Insurance System Based on Fair Premium for Determining Coverage Limit
Firman Pribadi, Eduardus Tandelilin, Mamdul M  Hanafi and Suad Husnan 2345

The Problems of National and International Legal Regulation of Intellectual Property Rights
Irina Mirskikh and Zhanna Mingaleva 2361

Modern Trends of Vertical Integration: Opportunities and Problems
Irina Komarova, Ekaterina Novikova and Elena Ustyuzhanina
An Analysis of Verbal Interaction in Elementary School Class using the Flanders Interaction Analysis Categories

Hyunwook Kim and Sekeun Ahn
Safe Reagent Management System for Volatile Organic Compound Management
Changsu Kim, Hyungwook Choi and Hoekyung Jung
Performance Accountability in the Public Sector: Applying a Social Mechanisms Approach
Sunjoo Kwak

Agriculture and Engineering
Air Cargo Decision Support System
Jakkawan Pootumrak and Narameth Nananukul
A Judgment of Intoxication using Pitch Contour Compare Signal (PCCS)
Seong-Geon Bae, Won-Hee Lee and Myung-Jin Bae
A Software Framework for the Rapid and Accurate Development of UAV
Jung Kyu Park and Jaeho Kim
Extracting Job Hunting-related Information From Web Documents Using Machine Learning and Characteristic Word Extraction
Masaki Murata and Shinnosuke Sawa
A Dissociation of Vision and Action for Selecting Grasp Positions in Different Task Demands
Takahiro Komatsu and Masazumi Katayama
Time Amplifier Based on Metastability-Dependent Time to-Voltage Converter
Ziyad Ahmed Al Tarawneh
Step Rate Measuring System using a Communication Module on a Smart Shoe
Si-Woong Jang, Dong-Hoon, Jung and Jong-Wook Jang
A Step Counting Method using a Communication Module on a Smart Shoe
Si-Woong Jang and Jong-Wook Jang
Design with Implementation of User and Simulation Management Tool for EDISON Middleware
Jin Ma, Inho Jeon, Jongsuk Ruth Lee, Kumwon Cho and Minjae Park
Big Data Based Disease Keyword Recommendation System
Changsu Kim, Hakbum Park and Hoekyung Jung
Sensor Flow Control System Based on Smart Home
Cao kerang, Hangil Jung and Hoekyung Jung
Medial Rotation and Lateral Rotation in Musculoskeletal Diseases
Associated with Shoulders

Seong-Yoon Shin

Facial Image Denoising from Degraded Rough Casual Photographs using

Hopfield Neural Network
Kwang Baek Kim and Doo Heon Song

'WiFi Direct Neighbor Discovery' Search Method for IoT-based Pill Box

Control
Yangmi Lim and Taejung Park

A Study on CPS-based Mold Information Management System for Smart

Factory
Hyun-Jun Shin, Sung-Jin Kim and Chang-Heon Oh

A Health Management Support System Based on Wearable Devices and

Internet-of-Things Platform
Munkhtsetseg and Jeongwook Seo

Industry Evaluation Analysis System for Enhanced Industry Analysis

Information
Kyungwon Kim, Tae-Beom Lim and Kyoungro Yoon

Automatic Ganglion Cyst Detection from Ultrasound Images using

Fuzzy C-Means Clustering Method

Alethea Suryadibrata, Doo Heon Song and Kwang Baek Kim

Performance Evaluation of Dual-Mode MSAG-MMA-MRD Blind

Equalization Algorithm
Young-Hwa Jeong

Design of Data Processing Model based Big Data Technology for

Connected Cars Services
Lionel Nkenyereye and Jong-Wook Jang

Manual Therapy for Flexion and Extension of Cervical Spine

Seong-Yoon Shin, Sun-Kyoung Kang and Hyun-Cheng Lee

WDM Transmission Links with Dispersion Management by Linearly or

Nonlinearly Incremented RDPS and Midway Optical Phase Conjugation

Jae-Pil Chung and Seong-Real Lee

SNS Based User Information Analysis System

Xitong Yang, Hakbum Park and Hoekyung Jung

Analytical Study on the Acoustic Noise Reduction Method of the Permanent

Magnet Motor

Hwang yo-han, Kim yong-chul, Shin duck-woong and Lee ju

Speedy Calculation Method of Motor Sizing and Performance for

Modification Design based on Tradition Model
YC Kim and Ju Lee

Fault Analysis of Dual Winding Motor
YC Kim and Ju Lee

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Grasp Position Selection based on Task Demand for Lifting up Target

Objects
Takahiro Komatsu, Takeshi Nakayama and Masazumi Katayama
Formation of Cell Micronuclei in Pregnant Women with Congenital
Malformations in Foetal Central Nervous System
Tatiana A. Sarymsakova, Gulnara U. Asymbekova
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SNS Based User Information Analysis System

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Abstract

Due to the combination of broadband convergence network technology and the popularity of smart devices integration, the number of SNS service users is increasing. And there are more and more companies use SNS as a basal publicity measure, which also highlights the importance of the SNS market. However, the constitution of SNS content data is more inclined to unstructured data than structured data. As the constant production and consumption of large amounts of data in real time, inefficiencies occurred in the existing data processing system.

In this paper, based on the user's SNS account of Twitter and Facebook to gather data in a distributed environment, which is similar to the recommended system based on the user or information filter recommendation. The proposal is based on the open source systems have been developed to ensure transparency, and implements the purposes of use by module, so that the application can be used.

Key Words: Recommender System, Hadoop, Mahout, MongoDB, OAuth, SNS

1. Introduction

Due to the development of information and communication technologies, SNS such as Facebook and Twitter is becoming an everyday culture [1,2,3]. Thus, users can always communicate with each other and share the useful information with others by SNS. However, as the SNS market increases, accurately find users and user groups which have the similar information with users in the large amounts of data becomes very difficult [4]. For this reason, the demand of recommendation system is increasing.

In order to analyze the users' tendencies existing recommendation systems require users to enter personal information and registration process. These recommendation systems are unable to meet users' demand for convenience. Recommendation system proposed in this paper does not require user registration process, and users can be recommended by existing SNS account instead. In addition, this system can be also used in modular applications or other fields, by using Open API [5], MongoDB [6], Hadoop [7] and Mahout [8], besides, the large amounts of data can be handled effectively.
2. System Design and Implementation

The proposed system aims at achieving SNS third party login and collecting the information of users. And the collected data can be implemented to share data in MongoDB and HDFS. Further, implemented an algorithm to compute the influence and filter data on the Hadoop environment, moreover, can provide a recommendation result to users by using Mahout. Figure 1 shows the structure of this system.

![System Architecture Diagram](image)

**Figure 1. System Architecture**

2.1. Obtained user's information by open API

In order to achieve third-party login a developer account is required and then the ID and password can be given. Twitter's developer account is shown in figure 2.

![Twitter Developer Account](image)

**Figure 2. Developer of Twitter Accounts**

The developer account consists of consumer key, consumer secret code, access permission, owner information. Grants of these developer accounts are received so that third-party login and API functions can also be used effectively to implement the functionality. Facebook developer account is also similar.

2.2. MongoDB installation and connection

In the proposed system, MongoDB 2.6.8 is used and code which stores the data of Twitter and Facebook into MongoDB is implemented by Java in Eclipse environment. And the query
screen of data which stored in MongoDB by running the implemented code is shown in figure 3.

**Figure 3. Data Lookup of MongoDB**

### 2.3 High-volume data process

In order to store large amounts of data sharing is an important feature. With sharing, single server's CPU and memory can reduce the burden by dividing a large collection of data into a split cluster when I/O loads generated. MongoDB sharing structure mainly consists of application layer, intermediary layer and data hierarchy. The sharing architecture used in proposed system consists of one mongos, three config and three MongoDB, just like figure 4.

**Figure 4. Sharing Architecture**

In the sharing technology, mongos is the most essential module and plays an intermediary party in the router process. Router process can store the data in MongoDB through mongos, and the status will be monitored from config server so that the information of sharing meta can be acquired and the sections which have been changed can be stored. Besides, by analyzing the quality of application layer a query in the appropriate shard can be performed.

### 2.4 Mongo-Hadoop connector implementation

Mongo-Hadoop connector library is used to perform an environment configuration what can process data in a distributed environment by connecting MongoDB with Hadoop. The work flow is Mongo-hadoop connector checks the data from MongoDB input collection and perform calculations on the data. Also, the collection is divided like shard chunks, and each division is assigned in hadoop cluster nodes, the parallel hadoop node will read split in MongoDB and process locally.
2.5 Users rank algorithm

User rank algorithm is an algorithm created based on the google page rank algorithm. User rank algorithm computes user's influence of the SNS network. The expression of algorithm is shown as follows.

\[
UserRank(U_i) = \frac{1 - d}{n} + d \sum_{U_j \in M(U_i)} \frac{UserRank(U_j)}{L(U_j)}
\]

Figure 5. Processes of Mongo-Hadoop Connector

\(U_1, U_2, \ldots, U_n\) means the user of SNS network, and \(UserRank(U_i)\) means the numeral value of user \(U_i\)'s influence, \(d\) means the attenuation coefficient and substituted with 0.85. \(n\) means the total number of users in this network and \(M(U_i)\) means the followers set of user \(U_i\), also, \(L(U_j)\) means the number of users who user \(U_i\) is following with. The data which SNS network collected is in a large number, therefore proposed user rank algorithm is implemented by using MapReduce in Hadoop cluster. This data sequence diagram of the whole process as described above is shown in figure 6.

Figure 6. Algorithm Data of Sequence Diagram
3. Experiment
This system implementation environment uses a PC with an Intel i5 CPU and 8GB memory. Also implemented by used the Ubuntu operating system and Hadoop cluster and MongoDB, Eclipse Juno, Oracle JDK 1.7, Maven 3, etc. The flowchart of this system is shown in figure 7.

Figure 7. Flowchart of System
The recommendation screen about filtered information to the Twitter users based on proposed system is shown in figure 8.

Figure 8. Twitter User Recommender Screen

4. Conclusions
The proposed system can recommend the right information to users just by users' SNS accounts, without complicated separated subscription. And this system provides a distributed processing environment which can process and store the large amounts of data using Hadoop and MongoDB. In addition, with the ability provided by Mahout in a distributed environment, it also can be applied in various fields. This system consists of transparency guaranteed open
API and framework, so it is expected to assist the researchers who want to study a recommendation system or a distributed system.

The future research is planned to develop a recommendation system which can recommend the useful information to users by collecting and analyzing the log analysis information of users' activities on the web sites.

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