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Improving Method of Evaluating Semantic Filtering for Human Computer Interaction in an Adaptive Collaborative Learning Environment

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Abstract

Human Computer Interaction Semantic filtering techniques are used in learning environment to track problems in collaborative systems. However, as noted in Adigun et al. [1], when sharing and dynamism are promoted, a problem of redundancy and integrity appeared not to have been well addressed. An improved ASF-based method of evaluating semantic filtering for social network systems in collaborative learning environment is developed, which assisted participants to achieve greater levels of performance with information sharing from other collaborators, as well as in reusing ideas across the period of collaboration.

Keywords: HCI; semantic filtering; adaptive collaborative system; participant; information sharing and reuse.

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1 Introduction

Human Computer Interaction Semantic filtering (HCISF) techniques are used in learning environment to track problems in collaborative systems. Human Computer Interaction (HCI) is the study, planning and design of the interaction between users and computers [2]. Semantic filtering is anything that has to do with the meaning process of asking around when looking for information on the Internet [3]. As such, HCI filtering attempts to facilitate interaction between humans and computers, with a view to improve the usability of collecting content relevant to concurrent real-time events. From major social networks, collection of a huge amount of growing implicit knowledge about people and domains of interest features in end-users' applications [4]. Recently, the Web is all about social utilities like Facebook, Twitter, YouTube, etc., which have reduced the use of portals and search engines. While users took control of the Web in order to be more accurate, they have shifted to a click and fans-based engagement system so as to be followed, to be shared, and to be mentioned. Whilst this set of applications allow freedom to navigate and be followed, when sharing and dynamism are promoted, a problem of redundancy and integrity appeared not to have been well addressed [1]. Issues of semantic filtering occur when users experienced a lack of integrity with the information provided for use on social networks. This leads us to investigating the process of improving HCISF particularly where adaptive collaboration and information sharing can be affected dynamically with the aim of reducing data redundancy and maintaining HCI integrity across social utilities' system platforms. This paper solves the problem by making use of database expansion and Active Semantic filtering (ASF) technique.

2 Methodology

We formulated our *active semantic filtering* (ASF) model enabling benchmarking, system sharing and mode reusing. ASF model work around four basic approaches: semantic filtering architecture, semantic filtering coding, semantic filtering application, and semantic filtering testing [5]. Typically, an ASF-based system is conceptualized onthree Rs workflow model, as seen in Fig. 1, specifically: R1: role—assigned action or activities (physical devices); R2: route—path for processing; and R3: rule—logical devices to measure the effectiveness and functionality of semantic filtering. This system aims at enhancing the usability and integrity of data in the interaction. Workflow model that integrates Fox and Grüninger [6] methods was used as a data modeling technique to define and analyze data requirements needed to support the adaptive collaboration particularly in dynamic environments enabling problem-solving platform for information sharing and reuse.

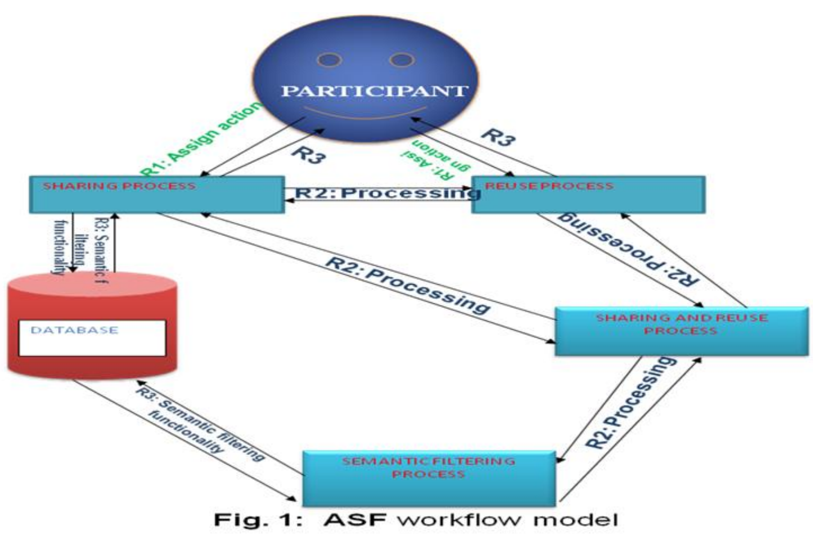

Fig. 1. Design process of the used ASF model

```
STEP 1-:  INPUT username, password
STEP 2:   process Registration
STEP 3:   IF new user
              3.1: THEN create username
              3.2: LET username = NAME
              3.3: LET password = GSM
          ELSE process password
STEP 4:   Process main menu
          4.1 IS new user
              4.1.1:    CLICK instruction menu
              4.1.2:    CLICK question menu
              4.1.3:    Need to share?
              4.1.4     CLICK share menu
              4.1.5:    Need to reuse?
              4.1.6:    CLICK reuse menu
              4.1.7:    THEN submit
          4.2 ELSE supply response
STEP 5:   GOTO STEP 4.1.7
STEP 6:   IF Logout
          THEN exit
          ELSE IF question end?
STEP 7:   THEN STEP 6
STEP 8:   ELSE next question
```

Fig. 2. ASF pseudocode design

Fig. 2 shows the design process of the ASF model used.

```
The registration and identity code of participants
<Entity Type Name="Participant">

<Key>
< Participant Ref Name="GSM" /> //password because it is the only   unique string in the
                                        database among the participants
</Key>
<Participant Type="String" Name="GSM" Nullable="false" /> //because a name can belong
                              to two or more participants. Therefore, GSM is serving as
                              participant's name
  <Navigation Participant Name="password"
                              Relationship="Participants Name. Password By"
           From Role="Participant" To Role="password" />
<Navigation Participant Name="password"
   Relationship=" Participants Name. GSM By" From Role="Participant" To
Role="password" />
// i.e. moving round the platform as a participant by the use of GSM as unique key
</Entity Type>
```

To test the ASF-model, a dynamic MySQL database was developed containing at least 100 participants' list and 20 issues raised by the administrator. The used questions were made available and accessed on the system by users through interrupt caller on Local Area Network (LAN). The system enabled participants to revisit the interface if questions had not been completed, and/or to post their responses to the issues raised, shared and/or reuse ideas posted by others. Three visitations were possible by a participant while at the end of the third visit, questions were terminated whether it was attempted or not to determine the benchmark level.

3 Results

The total number of participants per month per issue raised, number of visitations per month, total number of participants that shared ideas, total participants that reused ideas and the benchmark level were determined through word-matching as well as semantic filtering analysis of ideas shared and reused in the database. The total number of participants that were stored in the database was 104.

Participants that visited in first, second and third visitations were 101, 82 and 8, respectively. With word-marching and semantic filtering analysis, the Participants that get to benchmark level, shared ideas and reused ideas were 15, 92 and 45, respectively, with corresponding percentage number of 1.78%, 47.47% and 40.50%, as depicted in Fig. 3. When compared with the previous database system that encouraged the use of redundancy with no integrity where the benchmark has no value, both the sharing and reuse carried the same percentages, as shown in Fig. 4 [1]. The ASF-model assisted participants to achieve greater levels of performance with information sharing from other collaborators leading to an improvement in reusing ideas. The level of redundancy in ideas posed by the participant reduced, which was reflected by the 6.97% difference between the shared and reused ideas in the database. The study demonstrates that the use of ASF-based system, for information sharing and reuse, really discourages the redundancy in the database management system as shown in Fig. 3, but appears to solve the problem of data integrity in Human Computer Interaction due to the benchmark level and reuse. Because, not all participants shared are reuse.

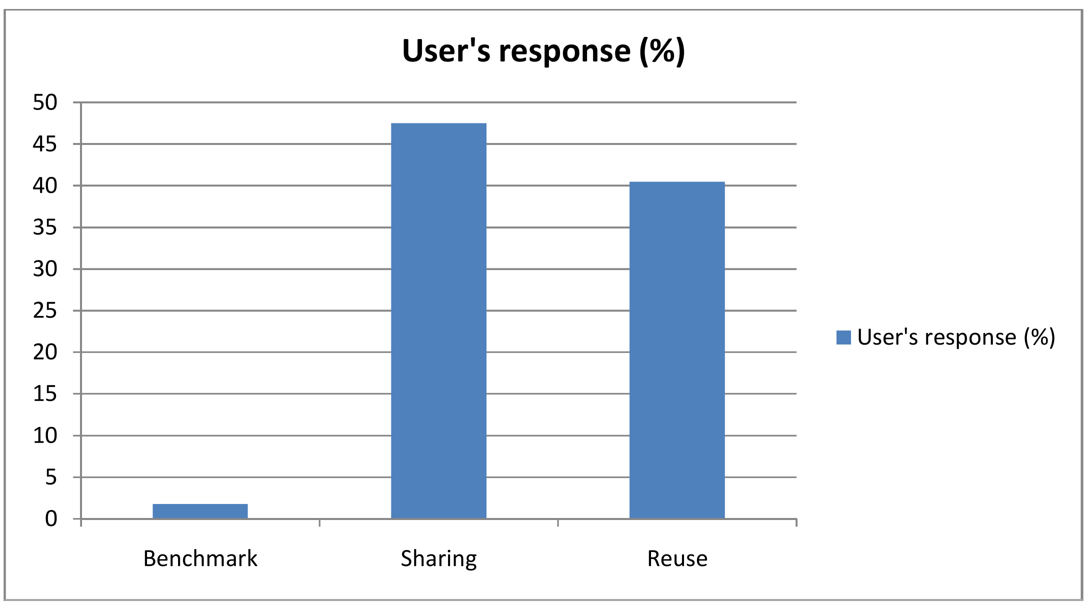

Fig. 3. Active Semantic filtering analysis database system

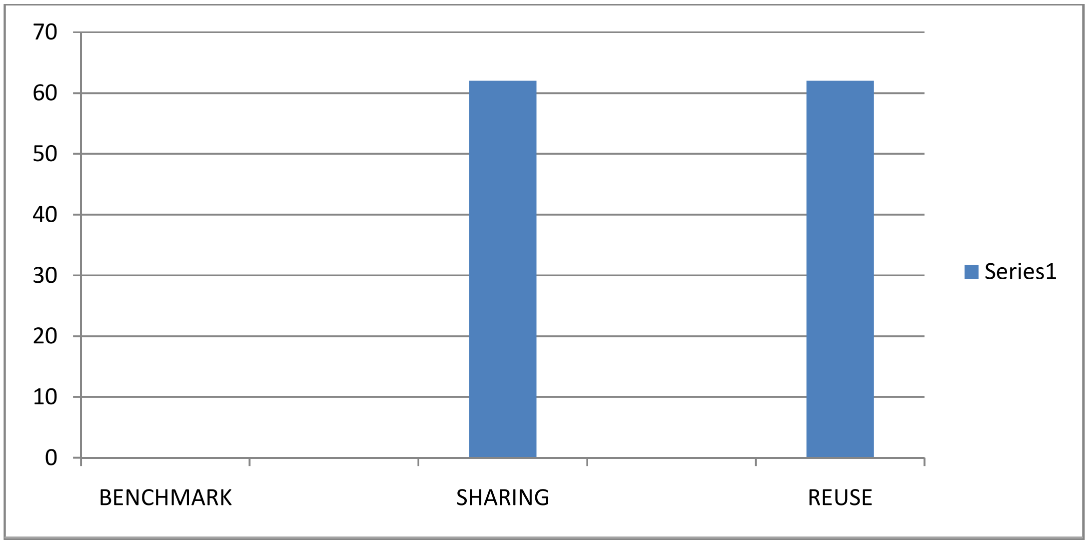

Fig. 4. Previous database system [1]

4 Conclusion

This study has provided an improved algorithm called ASF-based method of evaluating semantic filtering for social network systems in collaborative learning environment. The model assisted participants to achieve greater levels of performance with information sharing from other collaborators leading to an improvement in reusing ideas. The study demonstrated that the use of active semantic filtering model for information sharing and reuse really discourages the redundancy in the database management system but solves the problem of data integrity in Human Computer Interaction through the use of ASF-based method.

Competing Interests

Authors have declared that no competing interests exist.

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