Database for Gamification

IO10: Database for gamification

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EU FUNDED GUINEVERE PROJECT (2017-2019)

IO Number: 10

IO Name: Database for gamification

Description:

All of the events during the field test and during the pilots are being recorded and become an important list of outputs of the project. All data of the games which are being played by learners will be stored in a database and can later on be analysed as to the linguistic output.

In order to get data from the virtual worlds into the database, all gamified objects and games will be scripted to send information through a web portal to the database. This will be information about the user(s), date and time, group info, final results, etc. of the game(s) will add analytics dimension to the project and will enable some learner profiling to take place in order to help at risk or weaker learners and lead to an instructor intervention. This information will be used for later analysis but will also be used to create leaderboards and show other useful information in the virtual worlds and on web pages for the researchers.

Dissemination Level: Public

Signed off by: Project Coordinator

Date Signed off:

European Commission Lifelong Learning Programme Key Activity 2 (ICT)

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List of Abbreviations

BYOD	Bring your own device
CALL	Computer-assisted language learning
CLIL	Content and Language Integrated Learning
CMC	Computer-mediated communication
DS	Digital Schools
EFL	English as a foreign language
ESL	English as a second language
EU	European Union
FL	Foreign language
GUINEVERE	Games Used IN Engaging Virtual Environments for Real-time language Education
ICALL	Intelligent computer-assisted language learning
ICT	Information and communication technologies
L1	First language
L2	Second language
MALL	Mobile-assisted Language Learning
MC	Minecraft
MMOG	Massively multiplayer online games
MOOC	Massive Open Online Courses
MOODLE	Modular object-oriented dynamic learning environment
OECD	Organization for Economic Co-Operation and Development
OFSTED	Office for standards in education, children's services and skills
OS	Open Simulator
PC	Personal computer
PISA	Programme for International Students Assessment
SL	Second Life
SLA	Second language acquisition
TELL	Technology-enhanced Language Learning
TL	Target language
VLE	Virtual learning environment
WELL	Web-enhanced language learning

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1. Introduction

In the GUINEVERE project we do research on how to gather useful data from the games and gamified objects that are used in the different environments.

Many of the events during the field test and during the pilots are being recorded and become an important list of outputs of the project. All data of the games which were played by learners were stored in a database to be analysed later as for the linguistic output examples. In order to get data from the virtual worlds into the database, all gamified objects and games have been scripted to send information through a web portal to the database. This includes information about the user(s), date and time of access, group info, final results of the game(s) allowing to add an analytic dimension to the project. Having some learner profiling at disposal facilitates a more targeted support for weaker or at-risk students leading to instructor intervention, if necessary. The information gathered will be used for later analysis but will also be used to create leaderboards and show other data from the virtual worlds and web pages that will be useful for both researchers and educators. Specifically, the database activities focus on:

- Installing and creating the functional design specifications of the database to store all data from the games in the virtual worlds.
- Creating web interfaces for teachers to view the results of the users, groups, classes, etc.
- Creating in-world leaderboards and other external information signs, where users can see their own and other users' progress.
- Carrying out technical maintenance on the database server and backups

As IO10 leader, 3DLES will take responsibility for the technical development and implementation of the database and web interface including all external tools. 3DLES will work together with all other relevant output leaders during the project, ensuring the selection and adaptation of the best tools for this project.

2. General Data Protection Regulation

The General Data Protection Regulation (GDPR) is a European Union regulation designed to strengthen and unify Data Protection within the EU. The GDPR has replaced the existing UK Data Protection Act (DPA) from May 2018 and although in some regards it will be the same or very similar to the DPA, there will be significant changes:

- The GDPR contains an accountability principle, which requires us to demonstrate compliance in a manner which far exceeds the DPA.
- The need for consent underpins GDPR. Individuals must opt-in whenever data is collected and there must be clear privacy notices.
- Whereas the DPA doesn't require organisations to report data breaches, GDPR requires them to notify the supervisory authority within 72 hours.
- Penalties for non-compliance will be significantly higher, up to €20 million or 4% of global annual turnover.
- Employees and customers now have the power to request the deletion or removal of personal data.

In the GUINEVERE project we have implemented these regulations for the OpenSimulator environment as follows:
at the page where accounts for the OpenSim environment are created, there is information about the privacy policy.
By creating an account, the user agrees to the terms of service and privacy policy.
This information is available on a separate webpage as shown in fig.1.

Fig.1 GUINEVERE: create a new account page

2.1 Privacy on the Guinevere Virtual World

In order to access the GUINEVERE Virtual World, a personal account is needed. The account needs to be created on the GUINEVERE web portal: http://world.guinevereproject.eu:8002/wifi/user/account/ .

During the signup process, data such as user(s) first name, last name and password are collected; the latter will be safely encrypted in the GUINEVERE database. It is important to specify that in order to create a username, the use of real name is not required. In addition, user(s) email address is optional, it is not needed for creating the account. This is only used when a 'forgot password' request is sent by the user, through the GUINEVERE web portal.

If a user provides his/her email address and later decides to delete it from GUINEVERE records, he/she needs to send an email to info@3dles.com , and all the information will be deleted. User(s) email address(es) will not be used in the future for any purpose.

Once created, the account needs to be approved by the Virtual World manager before a user can log into the virtual world.

It is important to specify that in the GUINEVERE Virtual World, project partners intend to collect information for educational research purposes only.

Data collected include:

- The username, IP, User ID number, date and time when a user enters the virtual world.
- The preferred language the user wants to use.
- The birth year of the user.
- What objects the user has clicked on, sat on or walked through, including date and time.
- What games the user has played and what score the user reached, including date and time.
- The conversation the user has done with other users or with chat bots, using text chat.
- Observation of avatar interaction in the virtual world that may be video recorded.

At the first log in on the Guinevere Virtual World server, users will see a pop-up on their screen that will ask them to agree to the privacy terms mentioned above. If the user does not agree, he/she will still have access to all the islands but the personal data will not be collected. By accepting the terms, user(s) will provide consent to participation in the educational research mentioned above.

Users are free to withdraw from the study at any time. At every stage, his/her name will remain confidential. The data will be kept securely and will be used for research purposes only.

This privacy web page is linked on the registration page as well as on the information about privacy when first logging in.

2.2 Student Protection

When an account is created for the virtual world, it first needs to be approved by the manager of the environment, which is one of the GUINEVERE partners. This is done to keep strangers and unwanted users out , ensuring a safe environment. The OpenSimulator environment is not accessible in any other way.

2.3 OPT-IN or OPT-OUT

During the first log in, a user is asked to opt-in or opt-out, as shown in figure 2. This is done by displaying a Head Up Display (HUD) in the middle of the screen where the user can click on a link about the Privacy Policy, as mentioned above, and can choose to opt-in or opt-out. Once the preferred option has been selected, it will be sent to the database and the HUD will disappear.

Fig. 2 User opt-in or opt-out option

If the opt-out option has been selected, no other data of the user will be gathered than the name, a 20-digit random ID which is attached to the account and the tag that he or she opted out. All other data will be ignored. The user can still play all games in the virtual world but the results will not be stored.

If the opt-in option has been selected, the name and ID will be registered with the tag that the user opted in. Any other data like game levels etc. will be registered under the same ID.

If users want to change the opt-in/out settings, they can click on the 'Personal Data' sign (fig.3). This will trigger the opt-in/out HUD again so the user can change the settings.

Fig. 3 Personal Data sign

All data will be registered on a separate database system which resides on a protected dedicated server, solely rented for the GUINEVERE project, at a datacenter of OVH/SoYouStart in Roubaix (France). On this dedicated server, the GUINEVERE project partners run the complete OpenSimulator virtual world - http://world.guinevereproject.eu/ , a dedicated Minecraft world and a database with web pages and php scripts for the gathering and presentation of the data - http://data.guinevereproject.eu/.

3. GUINEVERE OpenSimulator Database

The database that is used to run the GUINEVERE OpenSimulator program is placed on the protected dedicated server at a datacenter of OVH/SoYouStart in Roubaix (France). OpenSimulator is an open source multi-platform, multi-user 3D application server. It can be used to create a virtual environment (or world) which can be accessed through a variety of clients, on multiple protocols.

The database that is used for OpenSimulator is solely used for running the virtual world. The user information in this database is only used to log in on the environment and holds only the first and last name, a 20-digit ID and the password. It is also possible to register the email address of the user but that is actually not needed for the login, but only for a password reset request done through the webportal of the Virtual world - http://world.guinevereproject.eu:8002/wifi/index.html.

4. GUINEVERE Minecraft Data

The data system that is used to run the GUINEVERE Minecraft program is also placed on the protected dedicated server at a datacenter of OVH/SoYouStart in Roubaix (France). The Minecraft system does not hold the user/password information. That is controlled by Mojang which is the company that created Minecraft. https://www.minecraft.net/en-us/. The login system of the Guinevere Minecraft checks the credentials of the users at the Mojang server during login. The Guinevere Minecraft system automatically logs several things including:

- Username and time during login and logout
- IP address of the user during login
- Commands the user applies to the system
- Text chat of the users

The log files are saved on the dedicated server system on a daily base and backed up regularly. For this project and also in general in Minecraft, users use fake names.

5. GUINEVERE gamification database

The database that is used to gather user data is placed on the previous mentioned protected dedicated server at a datacenter of OVH/SoYouStart in Roubaix (France).

The user and gaming data is only gathered from the OpenSimulator virtual world and only when a user give permission to store their data. When a user opts-out (see paragraph 2.3) only the name and the ID number of the user's avatar will be stored.

The data that is stored holds the name and ID number of the user, not the name of the real person behind it. It also holds result of games and tests that the users do in the Guinevere Virtual World.

6. Database development and implementation

For the development of the database we used a MYSQL DB system and PHP scripting on the server to handle the data coming from the virtual world. These scripts are server-side and can only be reached by protected http protocols. In the virtual world there are objects that can send information to the database through these http protocols. These objects can:

- sense the presence of a user's avatar
- detect if an avatar steps over a threshold or goes through a door
- detect when a user clicks on an object
- show information that is for a specific user
- store results of games or assignments

All above mentioned actions are sent to the http server, processed through php scripting and stored in the database including the ID of the avatar.

7. Use and results from the database

We mainly collected two types of data from the first Guinevere island for testing.
The first type of data we collected is the personal data of the user.

We collected the name and ID, but also the results of the Bartle test and the birth year of the user.

Next to that we made room to collect data from the games and gamified objects that would be played by the user. In this case we collected the results of the Quiz Chair which can be found in the first castle of the Guinevere island. Next to the Quiz Chairs the board

Fig. 4 Quiz chair game

shows the high scores of the users that played the quiz.

The personal data can be viewed by the user, all he or she has to do is click on the sign "Go to your personal page". He will be redirected to a webpage where this information is shown as a dashboard.

(see the pictures below).

Fig. 5 Sign to Personal data page

Fig. 6 Personal data page

The second type of data collected pertain to the movement of the users, only on the first island. From the moment the users enter the first island the position of the avatars, date and time of entry are registered in the database. When the avatars move around on the island, several sensors detect when they are in a specific area, when they move over a threshold, when they knock on a door, when they ring a bell, when they move over a bridge, when they solve a riddle and opens a gate. This is also logged in the database.

This way we can see how a user interacts with the objects in the environment and see the movements during the first example quest on the GUINEVERE island.

All data can be shown per date for all users of per user on separate dates.

It is also possible to show the data in a map of the island, so you can see how the user has been moving around. (see pictures)

Fig. 7 Data shown per date of access   **Fig. 8** Data shown on the island map

This system of data collection in this project is only used as an example to explain teachers and researchers what can be done using OpenSimulator as an educational virtual environment and how data collection can be done.

All in-world scripts, database setup and php scripts to connect the database to the virtual world are available for other educators to use and expand.

The data system can be accessed through http://data.guinevereproject.eu/

The protected data can be accessed with the username and password:

Guinevere - Preston 2018

8. Conclusions

This report provides examples of how useful data can be gathered and analysed through gamified objects and games played in the different virtual environments. The data available for analysis include information on the user(s), date and time of access, group info and final results of the game(s) played. This can offer crucial information on the linguistic output of players as well as their collaborative approach, their motivation, engagement with the platforms and their problem solving and creative skills. In addition, having some learner profiling available, can allows educators to provide a more targeted support, if needed. Data are in compliance with the GDPR regulation and users have the possibility to opt in and out once they have accessed the virtual environments. It is important to specify that when an account is created, it needs to be approved by the environment's manager.

All data are also registered on a separate database system which resides on a protected dedicated server, solely rented for the GUINEVERE project, at a datacenter of OVH/SoYouStart in Roubaix (France).

Finally, it is also important to highlight that all the personal data can be easily viewed by the user(s) if and when necessary.

Bibliography

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Guinevere account set up: http://world.guinevereproject.eu:8002/wifi/user/account/

Minecraft: https://www.minecraft.net/en-us/