Interactive Environment for Digital Preservation and Preservation of Fashion Objects

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Abstract. This paper presents the overall structure and the functional specification of an interactive environment for digital preservation and preservation of fashion objects connected with digital data repository, developed to serve the students' learning needs of the National Art Academy.

Keywords: Fashion Domain, Interactive Environment, Functionality, Services, eLearning, Digital Content Management, Learning Resources.

1   Introduction

Preserving and presenting the fashion domain is a long-term commitment of scholars, creators and researchers. From centuries every generation is aimed at keeping record about the work and life, so that it could be revised and studied by the next generations. For a long time this heritage has been maintained in repositories, museums and libraries, where not everyone was able to access this wealth. The specificity and complexity of fashion objects requires a thorough investigation of the domain so that it can be fully structured and described [2].

The following parameters must be considered when analysing a type of a garment:

- Year, season and name of the object/collection;
- Size of the garment;
- Material of the garment, parameters of the material: density, elasticity, elongation in X and Y, curves, cutting, etc.; variety of types of materials, fabrics: cotton, linen, silk, wool, leather (natural, imitation), synthetic materials, etc..; patterns, color, etc.
- Type of the garment /skirt, blouse, trousers, dress/;
- Intended wearers of the collection: women, men, children.;
- Occasion for which the garment is designed: casual, evening, sport.

The creation of the fashion object goes through the following stages:

- fashion sketch or drawing of the model;
- cutting out a pattern of a certain size;

- sewing a sample;
- final selection of the materials and accessories which will be used for making the end product (fashion item), depending on other factors—the author's view, special requirements for the collection, etc.;
- creating the final product (the so-called 'fashion object'), which is ready to be part of an individual or co-authored collection, to have an independent significance (possibly as an individual model or part of it) or to be an individually tailored object following a theme, genre, materials and accessories used, fashion trends, authorship, school, etc.

Also of significance is the purpose of the fashion objects—uniquely tailored or ready-made clothing, evening/formal wear, casual, sports, scenographic costumes, festive wear, work wear, uniforms, underwear, etc., as well as the methods of production—by hand, by machine, or mixed.

The ultimate vision of the fashion object or model is demonstrated in a variety of ways: through a photo session, a fashion show, live demonstrations, video clips, advertising, etc., shown in specialised publications and media.

Moreover, the interpretations of the fashion knowledge are not considered isolated from the standards and specifications in the field of fashion representation because the goal is to maximise the reusability and portability of its description.

New information and multimedia technologies that have been developed during the past couple of years introduced new methods of creation, preservation, maintenance and distribution of the huge amounts of collected material. For example, the process of creating a model object, model, collection, etc., is greatly facilitated by advanced IT tools such as:

- OptiTex (CAD/CAM system), used for digitalisation and creating cuts, scaling (enlarging and diminishing the details of the fashion object), marker making, automatic nesting, etc.
- Runway 3D – Realistic 3D Design Software for simulated rendering of the image of clothing by presenting it in a three-dimensional computer model, providing cloth simulation, parametric mannequin, graphic capabilities, etc.

2   Functional Specification of an Interactive Environment for Fashion Objects

Following the specifics of the fashion objects a special data model of the Interactive Environment for Fashion Objects (IEFO) is created (see Fig. 1).

It presents the main data objects, their descriptors, interactions and relations. For example, the central data object is Model related with all other.
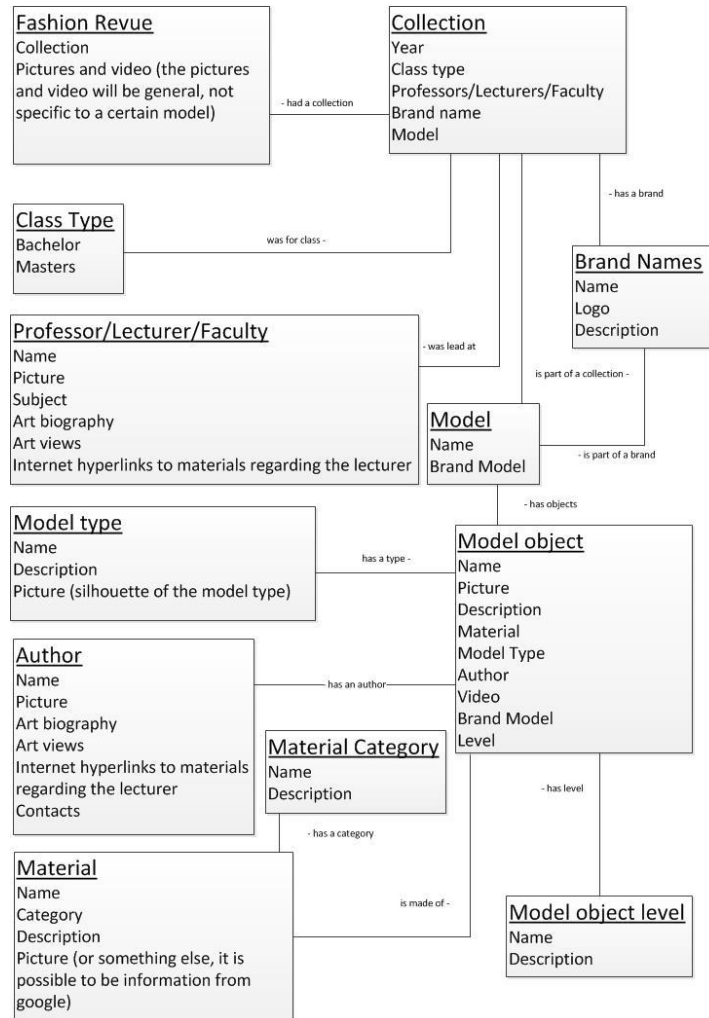
Fig. 1. Data model of the Interactive Environment for Fashion Objects

The data model above depicts the developed database solution (see Fig. 2).

Following some examples and directions [4, 5, 6, 7, 8], the interactive environment for fashion objects includes services for content creation, content presentation, content search, administrative services, and other services, mainly related to better fashion content observation (incl. learning). The environment will serve the following groups of users: Guests, Registered guests, Authors/Students, Professors/Teachers, Administrators. These roles are based on the way of using the environment incl. allowed access, rights, obligations, functionality usage, etc.

2.1 Content Creation and Presentation

The main part of the content creation process is the annotation and semantic indexing of digital objects [1, 3], in order to add them to the IEFO repositories. The metadata entering in the IEFO will be implemented through different automated annotation and indexing services.

An annotation template is developed for the description of fashion objects more completely. The template will provide several options for easy and fast entering of metadata:

- Auto complete services (All used (already entered) field values are available in a special panel for reuse);
- Automated appearance of dependencies coming from the relations of the defined metadata values, describing the fashion objects;
- Possibility for adding more than one media for one metadata description in order to create rich multimedia digital objects;
- Reuse of an already created annotation for new fashion objects: the new media object has to replace the older one, the annotation is kept and the new fashion object appears after saving;
- Possibility for automated resizing of the image objects;
- Automated identification of file formats;
- Automated conversion of the video and text objects in a format suitable for Web-preview;
- Terminology dictionary - As a part of the content creation panel will be included a terminology dictionary. After saving a new fashion object, a special machine traces for the appearance of dictionary terms in the object data. If some terms are available the machine adds links to their explanations. In the case of entering a new dictionary term, its presence in the available objects is discovered automatically and a link is added.

During the development of the content presentation services a profound analysis was made of content selection and preview possibilities in order to satisfy the user's needs. First we had to determine the preview possibilities of a separate fashion object and its components and after that the preview of grouped objects.

The visualization of the rich semantic description of the separate fashion object is determined through hidden parts appearing in a new window after link selection. For example, this possibility is used for long author's biography, dictionary terms, etc. Parts of the descriptive data field are also hidden, but their values are available for searching in special forms.

The content presentation services includes also object grouping services. The main values of IEFO data model are selected as object grouping criteria. Using grouping options the guest users (registered or no):

- can see separately a list of all designers (authors), and selecting one of them he can see additional biographic information and the collections of their work;

- can see separately a list of fashion object type, and selecting one of the type he can see all fashion models of this type, link to collection of every model and brand name;
- can see a separately a list of all created brand names, and selecting one of them he can see all models with this brand and all fashion revues of the brand.

Every registered guest can create his private collection of selected objects after search activity. Rich search possibilities (see the section 3.2) are available in order to assist collection creation. The registered guest can write the collection's title and short description. He can also select its status: private or shared with other users.

Section 3.4 includes extended presentation of users' activities incl. additional access and object review.

3   Functional Specification of Learning Resources

After building up the *IEFO* (Interactive Environment for Digital Preservation and Preservation of Fashion Objects) it was discovered that there is potential for an entirely direct connection between the practical part which is widely used in IEFO from the birth of the idea to its realization into a fashion object, collection and a fashion show and the theoretical preparation necessary for this entire cycle.

Thus the idea for creating an electronic storage (*LEARNING RESOURCES*) emerged, which would store this entire theoretical part, where by creating the necessary connections between IEFO and LR, it would not remain only a passive library, sorted in a particular way, but would also add to the IEFO from a environment, in which practical model can be created, where at every step of the creation the authors have the easiest and quickest possible access to the theoretical knowledge necessary for that.

For the said purpose two steps are needed:

1. Creation of an electronic storage (LEARNING RESOURCES)
2. Establishing connections between LERNING RESOURCES and IEFO

Creation of an electronic storage (LEARNING RESOURCES)

An electronic storage is built and organized for different kinds of electronic resources and content (i.e. hypertext pages, tasks, video clips, etc.), for the purpose of providing an unlimited number of electronic resources in real working conditions. The storage implements technologies and methods for automatic maintenance of digital storages and thereto connected activities like: generating, updating of virtual catalogues, organization of searching by content, remedying of discrepancies, etc.

LR has the capability of working independently as a system for storage of learning materials with a centralized access from all other systems for the purpose of ensuring of a unified electronic archive with digital learning materials with the following functionality:

- Centralized access to the learning materials for each professor. The professor has at their disposal a personal digital library to which they provide a partial of full access to the students (the authors of fashion objects) from each separate study course;
- Capability of storing files/resources, search and extraction of information back from it;
- Indexation of the digitalized documents (manual, automatic);
- Sorting and processing of digitalized documents and creation of a database of digital photographs;
- Processing of new documents, adding and uploading to the electronic storage.
- Capability for each professor to share partially or fully the learning content with other professors;
- Building of an Internet portal for controlled access to the virtual library;
- Building of a virtual archive containing the academic articles and publications of the professors, with profiles of each professor.

The main non-functional characteristic for the creation of the storage is that it needs to have a built-up web interface not dependent on the platform and the operation system.

The storage maintains the following standards for metadata:

- The standard IEEELOM defines a multitude of metadata used for description of learning resources. The elements of metadata are divided into nine main categories (General, Life Cycle, Meta-Metadata, Technical, Educational, Rights, Relation, Annotation, Classification).
- The standard Dublin Core which defines the following information: title, author, aim, description, publisher, contributors, date, type, format of drop menu list, identificator, source, language form a drop menu list, connection, scope, rights.

Establishing connection between LERNING RESOURCES and IEFO

The existence of LERNING RESOURCES and IEFO on their own is possible but the realisation of integration between the two systems completes the entire cycle of training in a particular subject and the possibility for the result of such training to be seen in practice.

In order to establish connections between the two systems a reconciliation of a part of the database of the two systems is necessary and filling-in of new attributes upon creation of new learning materials in LR.

When adding new learning materials apart from the necessary data as per the standards Dublin Core and IEEELOM, it is necessary to fill in also a number of data necessary for the integration with IEFO, where the integration is possible via choosing of data from drop menus and checkboxes.
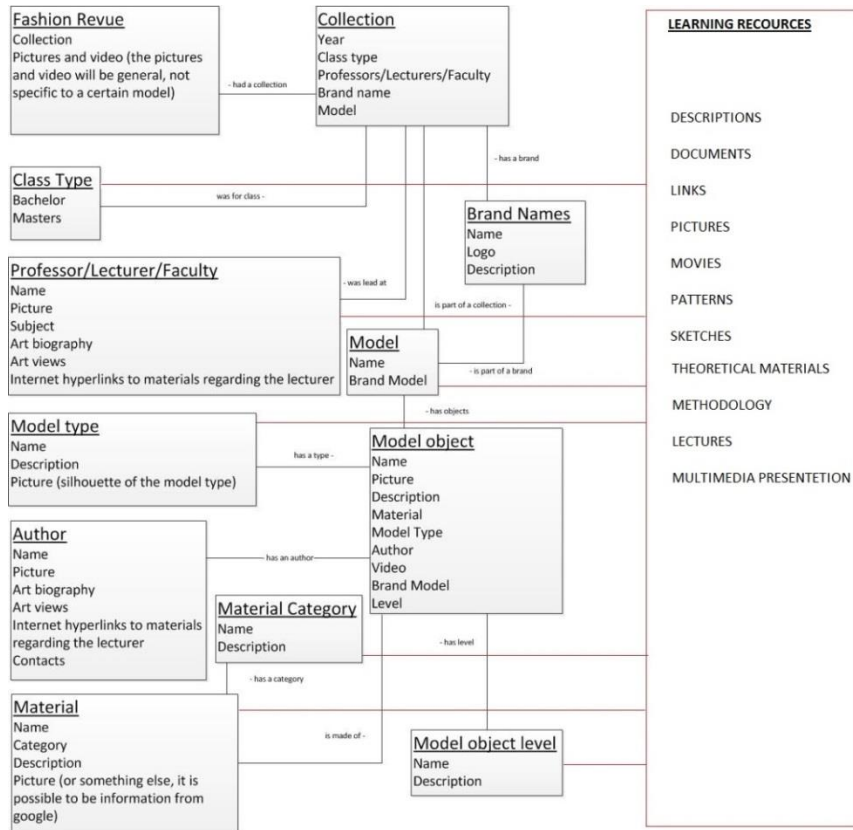
Fig. 2. Data model of the Interactive Environment for Fashion Objects connected with digital data repository

3.1 IEFO to LERANING RESOURCES

The addressing of IEFO to LR is realized via linking of key words encountered in IEFO (realized via a dictionary of key words) or visualization of titles of learning content connected to the particular stage in which the construction of the fashion object is going through on the right side of the screen, where they appropriately refer to respective learning materials LR (realized via additional description of learning materials).
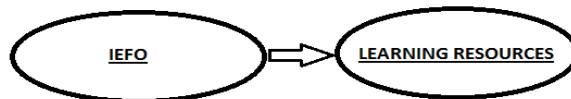
Fig. 3. The flow of movement of data

3.1.1 Dictionary.

The inbuilt dictionary for key words in IEFO connects to the titles and the text content of the learning materials in LR, and where key words in IEFO are encountered they shall link to learning materials which are contained in LR.

Example:

- Material
- Material Category

Anytime IEFO mentions the type of material of which the fashion object is made or its category a connection is established with learning materials referring to the material itself and its category.

3.1.2 Additional description of the learning materials .

Standard date for LR as per the standards:

- Title
- Author
- Year of publishing
- Distribution
- Country of publishing
- Language
- Date of addition

- Source
- Full description
- Name of file
- Type of file
- Title page
- End page
- Intellectual rights

3.1.3 Necessary date for integration with IEFO

- Model Object Level, establishes a connection on all levels which the realisation of a fashion object with learning material in LR goes through (drop menu)
- Professor/Lecturer/Faculty, establishes a connection with all learning materials uploaded by a particular professor (drop menu)
- Model Type establishes a connection with the learning materials for particular fashion types (checkboxes)
- Class Type establishes a connection with all materials for the respective educational qualification degree (checkbox)
- Model, establishes a connection with learning materials for fashion models
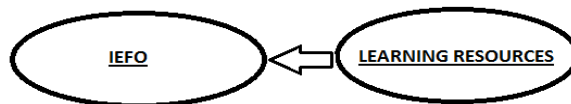
3.2 LEARNING RESOURCES to IEFO

Fig. 4. The flow of movement of data

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The feedback from LEARNING RESOURCES to IEFO is realized again via the dictionary and the additional description of data to the learning materials. Its goal is to demonstrate fashion objects realized in practice, where they can respectively be visualized per authors, collections, fashion shows in which they appeared.

This capability for presentation of ready models completes the theoretical learning contents and its practical realisation.

4 Content Search

IEFO and LR will provide a wide range of search services, such as keyword search, extended keyword search, complex search (in the metadata descriptors, its values or both) and search with grouping results. Their realization was based on querying action to the IEFO and LR knowledge base using mainly the structural branches of the IEFO and LR data model. Moreover, five types of conditions for the results set are meant:

- "objects having value $= v$ for characteristic c "
- "objects having numeric value $\geq, \leq, <, >, or = v$ for a characteristic c ". In the search templates you could search fashion objects with precise date or period. The period could have concrete values.
- "objects having characteristic c "

The search services support content request and delivery via index-based search and browse of managed content and its description.

5 IEFO and LR Usage

5.1 IEFO Usage

The five groups of IEFO users could perform the following activities:

— *Guests* - These users will be registered or unregistered. The unregistered will have access to a limited number of functions: they can only view and access the models/reviews in the system. They will also have access to the shared by the students (authors) information. However, the author has decided to share his personal information (eMail, mobile number, etc.) that the guests will be able to contact. The registered guests have access to a wider range of functions in the system such as - creating different users' groups based on their declared interests. While browsing in the system they will be able to share similar fashion objects/models to other users or their group.

Moreover, when the guest makes his registration, he can declare his interest by checking check boxes with all model types and material categories. New objects which are of these model types or material categories appear automatically after entering of this user. The registered guest will receive an email with message for new information preferred.

— S*tudents/Authors* - Each student will have their own personal profile which will allow them a wide arrange of functions such as:

  o to share the stages of their fashion objects (sketches, patterns, test models and the finished products) with the other Students/Authors and thus they will be able to cooperate easily for the creation of joint new models and collections.

  o to browse over the shared model/objects from other authors selecting different criterias such as: type of model, material category, etc., as well as the different stages of creating each object.

— *Administrators* – The administrators of the environment will track and perform the administrative services, described above.

5.2   LR Usage

— *Professors* – Each professor shall have their own profile via which they would be able to upload, edit and delete their learning materials in the system.
— *Students/Authors* – These users will be registered or unregistered. The unregistered will have access to a limited number of functions: they can only view and access the information in the system.
— *Administrators* – The administrators of the environment will track and perform the administrative services, described above.

Since in both systems different types of users exist:

- Professors
- Students/Authors
- Administrators

it is advisable that they are in the same database and identical for both systems because they are already programmed into the IEFO and they can be used for LR.

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