ORTHOGONALITY OF STRUCTURED DERIVED ENTITIES

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Abstract

Structured entities, derivative entities and their order are presented. The orthogonality metric for structured and derivative entities is build. This metric is implemented. The sets of structured entities and first order derivative entities will be evaluated and analyzed.

Key words: structured entities, derivative entities, metric, sets.

1. Structured entities

Structured entities are defined based on component inclusion property. Structured entities create and implement storage and processing forms which are used for information management and are represented using the tree structure.

Among the components of a structured entity there is a relationship of dependency, these are defined and constructed using components located on lower levels, the complexity of structured entities increases from lower levels towards the root level. The tree of entities identifies existing components on each level, the leaf components and the links between the levels of the entity, the entity structure involves the identification of its dependencies.
Each component of the entity has its correspondent in the real plane, reflected by levels or sublevels of organization.

Structuring of the entities is made based on the arrangement of elements constituting the analyzed system built structures are working with information stored in the implemented tree. The conditions which should be respected in the structuring process involve the arrangement of entities on levels and processing information stored on each level.
The organization is done in different fields of activity, the definition of text entities being made following the structuring criteria and the operating information.

Structured text entities are built on basic concepts such as:

- the symbol is a way of representation; by using symbols the correspondence between objects, concepts, images with their representation is made;
- the alphabet is a finite collection consisting of letters used in writing a language, the basic feature of letters in order to create the words of a language is to respect a conventional order; according to the symbols used, the alphabets are classified into phonetic and symbolic alphabet like Morse, Braille; starting from the basic

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role of the alphabet, which is to create the sounds of a language, the implications of the alphabet were extended to new areas of interest; in computers, the alphabet defines all the symbols that form a programming language;

- the word is a combination of a meaning and a complex sounding; the word is the basic unit of the vocabulary; depending on how words are forming, words are classified into: primitive words - words that serve as inputs in the formation of other words, compound words – words formed by composing several words, and derived words - words formed starting from another word; a word can have one or several meanings;
- vocabulary consists of the set of words specific to a language; the use frequency of words divide the vocabulary into:
  - active vocabulary that consists of all words specific to a language which is actually in expression;
  - passive vocabulary containing specific words of a language not commonly used;
  - basic vocabulary consisting of basic stock of used words;
  - secondary vocabulary which forms the vocabulary mass;

  also the term vocabulary defines the words specific to social categories, areas of activity, research;
- the separator is a symbol that does not belong to the alphabet which has the role of delimiting the words of the alphabet when used to transmit information; the texts are constructed by using separators; separators *: ; ? ! @ # $ % ^ & * ( ) ` ~ , . < > / \ - _ + = | " ' [ ] " " } {* are allocated to the set of separators;
- the frequency of occurrence is an indicator that provides information about the use of terms of the basic vocabulary of structured entities; based on the number of occurrences, the terms are divided into:
  - low-frequency terms are terms which in a number of words have a low number of occurrences;
  - high frequency of occurrence terms, are terms which at a given number of words have a high number of occurrences;
- the text consists of several separate words that send a certain information; the text is characterized by the length, measured in number of words or in number of symbols used, by the frequency of occurrence of words or symbols, and the degree of membership to a vocabulary based on which it is determined whether the text uses terms from a field;
- thesaurus is the collection of all words considered defining for an area;
- the referred system defines all structured elements, studied and implemented using structured entities.

The following steps should be made in order to create structured entities:

- identify the correspondences between entity and system;
- identify the existing links between system elements;
- transposition of interdependence within the entity's system.

The analyzed system is a complex construction, carrier of information and which shows an arrangement of information based on the precedence relations and interdependence.
Structured entities play roles that involve interaction with the users, such as:

- collecting data implies the existence of a calculation method to allow the users to access the structures of entities;
- the storage of data ensure retention of information with the help of structured entities for future analysis;
- updating data requires a software module that can access the existing information, to validate new information and to update the old information; updating is done by total replacement, where the old information is overwritten, or rewriting certain parts of the old information, with its preservation; the updating module must ensure the preservation of earlier versions of entities, in order to indicate their evolution and improvements;
- data acquisition is the function which ensures the data processing, according to the requirements and software modules implemented; on the basis of processing performed on structured entities, the necessary results for the organization's management are provided.

In the process of comparing entities, an essential condition is the degree of their homogeneity.

Entities are structured starting from the basic level, considered the 0 level. Upper levels are made based on concepts taken from previous levels. For an efficient structuring, concepts and relations between them should be known very well.

For each level of a structured entity, its lower level is considered basic level, and concepts on the same level are concepts with similar degree of applicability.

Starting from this representation, the structuring method of the relations between concepts is created, following that in order to certify the entity's structure, to identify to what extent the concepts implemented meet inclusion relationship.

An important aspect of the concept of structured entities is the entity model. Entities are used to filter, store and sort the data and information. The particularity of entities is given by the fact that it allows the implementation of conditions to identify data and information that respect the disposition order imposed and which contain information related to a domain. All these conditions are defined by the entity model. The entity model builds the entity's structure and based on this the data storage rules, storage order, terms of validation are listed.

Using the entity model the concept of entity-type is implemented, used to validate data and information processed and stored using structured entities.

The data used with structured entities are oriented data. Their essential feature is that it meets all requirements of the entity type mode. Validation of data and information to be recorded in data-oriented category is made by identifying the membership field, testing their relevance to the targeted data already stored, and by determining the degree of orthogonality of the data.

Structured entities have a high degree of similarity with database tables, in the way they are used. The difference is that the user is the one who creates and applies criteria for

working with oriented data; structured entities do not require a management system such as databases.

Entities systematize information from various activity fields. Customizing the information to a particular area involves establishing criteria that will ensure the membership of information to the considered area. The main role of structured entities is to ensure that stored information belongs to a collection, to a field. Imposing conditions related to the content, to the form of expression, to the method of arrangement contribute to storage of information on areas of interest.

The degree of difficulty of the concepts used in the entities provides clues about the level of representation used. The word, the symbol and the separators are used in the table of contents of texts and in the construction of text entities. The vocabulary and thesaurus are created taking into account the membership of words used in an area of interest defined by thesaurus and vocabulary.

2. Derived entities

Derived entities are entities constructed from data contained in structured entities.
It is considered a vocabulary V consisting of words c_1, c_2, ..., c_N, $V = \{ c_1, c_2, ..., c_N \}$, where N is the number of distinct words in the vocabulary V. Also, it is considered structured entity ES, which contains words c_1, c_2, ..., c_N.
Consider the vocabulary $V_D = \{ cd_1, cd_2, ..., cd_M \}$, some of the words cd_1, cd_2, ..., cd_M can be found in the vocabulary V.

A derived entity ED is defined as a concatenation of words cd_1, cd_2, ..., cd_M, it can take almost all the words used in the construction of a structured entity. V_D vocabulary is constructed by including the terms contained in the vocabulary V, and by inserting terms that do not belong to it.

If $ES \cap ED = \phi$, it should be stated that the entity ED is composed of words independent of the ones of the structured entity, with the derivation level of 0. If $ED \cap ES \neq \theta$ then entity ED is derived with a degree of derivation belonging to the interval (0, 1).
ED entity has the maximum degree of derivability if its degree of similarity built by reference to entity ES is 1.

ED is a derived entity if:

- it consists of the same words which make up the entity ES:
  $ES = ES \cup \{ cd_i, ..., cd_k \}$, where cd_i, ..., cd_k is the set of words that distinguish the two entities;
- vocabulary $V_D = \{ cd_1, cd_2, ..., cd_M \}$, $V_D \subset V$, contains the words on which the derived entity is built. The words contained in vocabulary V_D are built in order not to differentiate significantly from the words in vocabulary V;

- rules for building entities are common and relate to the length of each text which must be within specified limits and a requirement that the entity derived vocabulary must include words from the vocabulary of the ES entity.

The sets of derived entities concern:

a) developing a project, which means to generate the text $T_1 \subset V$ corresponding to the title of the project, then the text $T_2 \subset V_D$ is generated, which is the title of an intermediate project, which is part of the initial project, in such a way that $V_D \subset V$, respectively the vocabulary built for the intermediate project title is included in the vocabulary used to build the original project title;
b) building a model for storing a performance index indicating the presentation and the explanations that are given for the variables used; it is specified the scope of definition for the indicator constructed, [0, 1];
c) developing programs to identify the degree of membership of derived entities within the structured entities.

Derived entities are constructed in order to study the structured entities. These represent the basic entities in detail, keeping the field of application and the chosen theme. In this way, through derived entities the basic entities are presented in detail. Derived entities contribute to building the basic entities. In a manual focused on the presentation of theories, component parts - chapters define the concepts that form a whole - the manual.

Figure 1 shows the relationship between structured entities and derived entities.

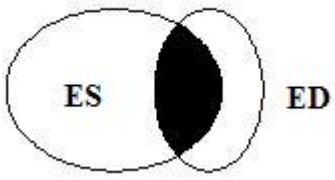

Figure 1 The relationship between structured entities – derived entities

As shown in Figure 1, derived entities are constructed in such a way to address the issues dealt with the help of basic entities, but by using specific terms which do not necessary need to be part of the proposed analysis through structured entities.

The basic characteristic of derived entities is that entities are similar in the way they are constructed and approached to the basic entities. The difference between the two entities is given by the use of distinct terms. To comply with the membership to the same domain, the influence of different terms that are used to build the derived entity must not exceed 25% of the total terms used in the construction of derived entity. The role of the derived entity is to contribute in the creation of structured entities, by detailing their content.

3. The orthogonality metric

Orthogonality studies the degree of resemblance between two or more entities. Through this quality characteristic, the extent to which the entities differ from each other is studied.

The concept of orthogonality comes from mathematics, which takes into account the following aspects:

- two planes are orthogonal if the angle formed at their intersection is equal to the cosine of zero; a finite set of planes is orthogonal if the planes are perpendicular two by two;
- two lines are orthogonal if they form congruent adjacent angles; a finite set of straight lines are orthogonal if the lines are perpendicular two by two;
- two vectors are orthogonal if their scalar product is null; a finite set of vectors is orthogonal if the scalar product of any two different vectors is null.

Orthogonality is studied on the basis of orthogonality criteria. With these criteria the features that have the same value for the studied entities are highlighted and the levels of similarity are determined.
The orthogonality of the text entities is studied taking into account:

- content of information;
- the signs used to show information, respectively the entities' semiotic;

To study the orthogonality, a normalized indicator of orthogonality is defined in the range [0, 1], which takes the following values:

1 - the elements are orthogonal, meaning they have nothing in common;
0 - items are identical, meaning they do not have different values for any feature.

If the indicator value tends to 1 it means that the data sets of the two entities tend towards orthogonality, if the indicator value is close to 0 it means that data sets have many identical elements.

Article [10] presents ways to build data sets in order to define indicators. The software metric is a mathematical model that includes one or more equations or inequations and has one or more objective function and its role is to describe the associated system state [BOJA04]. The metrics are models implemented to test the quality of the entities, taking into account factors influencing the measured feature.

The need for using metrics is given by the following aspects:

- allow setting targets for improving implemented entities;
- provides a real way to achieve these goals;
- allow the identification of the causes that adversely affect the quality characteristics of the structured entities;
- identify the requirements that should be followed to develop models of structured entities qualitatively superior;

Metrics test the differences between the entities resulting from implementation of a structure model and the expected results and determine the causes that led to these differences.

Metric is a definition, an algorithm or a mathematical function used for quantitative assessment of the product tested.

The measure is a numerical value obtained by direct or indirect measurements. The measure is also an input, output or the value of a metric.

Metrics are management tools used to estimate project cost and resources.
A metric is constructed to achieve the following objectives:

- quantifying the characteristics;
- determine the influence of indirect factors;
- aggregation of values;
- benchmarking.

Orthogonality of entities is assessed according to their content, as follows:

- orthogonality at the text level which consists in the definition and quantification of the primary indicators; the quality characteristics of texts are identified, selected and ranked in relation to the analysis performed, the syntactic structures which carry out the analysis are delimited, the values of indicators are aggregated in order to obtain an overview of the phenomenon studied;
- the orthogonality of constructions with numeric or alphanumeric representation, such as tables, figures, diagrams; structural elements are identified and analyzed, indicators are developed for comparative analysis of structures and elements of text and apply the aggregation operation to the values obtained on the two types of components.

A synthetic indicator of the orthogonality of entities must include aspects of both directions of analysis. Otherwise, the metric is incomplete.

In the case of structured entities, it assumes that each entity has a set of quality features defined on which its characterization is carried out. Starting from the characteristics of the entity, its features are identified. A practical method for grading the quality of the entities is to provide a number of points for each importance feature, thus making a classification of entities.

Indices allow the comparison of values for the same feature, either over time or depending on space or other factors.

Consider the text T_1:
T_1 = *{ Ortogonalitatea textelor oferă informaţii despre nivelul de originalitate al textelor şi despre nivelul de asemănare al textelor }*.
T_1 text comprises four linkage words: { *despre, de, al, şi* } and consists of seven distinct words: *(Ortogonalitatea, textelor, oferă, informaţii, nivelul, originalitate, asemănare).*
For the text T, orthogonality indicator is given by the relation:

$$H(T) = \frac{NC}{\sum_{i=1}^{NC} f_i}$$

where:
NC – the number of distinct words that appear in the text;
f_i – frequency of occurrence in the text of the word *i*.

The orthogonality indicator corresponding to the text T_1 is $H(T_1) = 7/10 = 0.7$.
In order to increase the orthogonality of the text, the text T_1 is modified as follows:

T_{11} = *{ Ortogonalitatea textelor oferă informaţii despre nivelul de originalitate şi asemănare ale acestora }*.

After modification the words that were repeating have been removed, the orthogonality indicator having value 1, respectively $H(T_{11}) = 7/7 = 1$.
Consider the text T_2 = *{ Ortogonalitatea textelor este un indicator de originalitate }*.
To establish the orthogonality of texts $T_{11}$and T_2 the following indicator is used:

$$H(T_{11},T_2) = 1-\frac{NCC}{\max\{LG(T_1),LG(T_2)\}}$$

where:
NCC – the number of common words;
LG() – the length of the text.

For the texts considered the level of orthogonality $H(T_{11},T_2) = 1 – 3/7 = 0.57$ is low, indicating that T_{11} and T_2 are similar texts.

Consider the texts T_K and T_R representing two procedures that compute the sum and the maximum of three numbers respectively:

```
procedure sum(int a, int b, int c)
{
int nr;
nr:=0;
nr:=a+b+c;
printf("%d", nr);
}

procedure maxim(int a, int b, int c)
{
int nr;
if (a>b) nr:= a; else nr:= b;
if (nr<c) nr:=c;
printf("%d", nr);
}
```

On the two procedures the orthogonality indicators are applied.
Tables 1 and 2 are constructed containing the terms of which the procedures are formed and the frequencies of repetition:

Table no. 1 Frequencies of repetition
of terms in *sum*() procedure

Terms	**Frequency**
int	1
nr	4
: =	2
+	2

printf	1
%d	1

Table no. 2 Frequencies of repetition
of terms in *maxim*() procedure

Terms	**Frequency**
int	1
nr	6
if	2
>	1
: =	3
else	1
<	1
printf	1
%d	1

Comparing texts T_i and T_j consist in reporting one to another. Interpretation of resulting value differs depending on the text defined as the basis for comparison.
The H_L indicator compares two or more texts, by comparing their length.
It is defined using the formula:

$$H_L = \frac{LG(T_i)}{LG(T_j)}$$

where $LG(T_i) < LG(T_j)$, and acts as a weight of the text having the smallest length in the text of greater length.
When the indicator is set to *1*, the two entities have the same number of words. This indicator independently analyzed does not provide sufficient information on the orthogonality of entities.
For the texts T_K and T_R:

$H_L = 6/9 = 0.67$.

Vocabulary diversity, H_D, shows to what extent the words are used in texts.
If N_C is considered, the total number of distinct words used in a text entity and f_i, the frequency with which the word c_i is used, then, if the indicator

$$H_D = \frac{N_C}{\sum f_i}$$

is *1*, each word is used one time. The more it tends to *0*, the more the words are used very often in the text entity.

For the text T_K, the value of the indicator of diversity is:

$H_D(T_K) = 6/11 = 0.54$.

The value of the indicator for the text T_R is:

$H_D(T_R) = 9/17 = 0.52$.

The length of the alphabet used is given by the number of characters used. For the texts T_K and T_R there are defined:

- the number of common characters;

- the frequency of the common characters;
- the number of letters used in both entities.

H_A indicator is defined by the following relationship:

$$H_A = 1 - \frac{CC}{NC}$$

where:

CC – the number of common characters that have the same frequency in the two texts;

NC – the number of characters used in both texts.

$H_A(T_K, T_R) = 1 - 3/10 = 0.7$.

The particular features of indexes:

- result from applying the comparison model in report form;
- result from applying the synthesis model because it is calculated at the level of a complex feature in which the individual values are centralized through a statistical aggregation.

Elements outlined above take into account the statistical criteria for the classification of metrics. Depending on the nature of the numeric expression, the metrics of structured entities are:

- continuous - the numerical expression is a range of values;
- discreet - the numerical value obtained by applying the model associated to the indicator is an accurate one.

Depending on the nature of the characteristic that is taken into account, the metrics are classified into:

- metrics that are directly measurable - are associated with quantitative characteristics; the length of a structured entity, regardless of expression, involves counting the components that have the same unit of measurement;
- metrics that are indirectly observable or measurable –are associated to qualitative characteristics which involve taking into consideration both quantitative indicators and subjective aspects related to the mental representation of the one that is using the entity; a characteristic of qualitative nature of a structured entity reffers to its contribution to the development of the field; the assessment of a metric associated to this characteristic takes into account numerical aspects (number of concepts, techniques and methods, methodologies and new technologies that are introduced) as well as subjective elements, by making associations between the described and their perception of the real world by the reader.

By the criterion of complexity, metrics are:

- complex – models associated to metrics involve the use of a large number of variables and their implementation requires thorough knowledge of mathematics; also the determination of values of variables involves the application of preparatory operations: normalization, grouping, aggregation;
- simple – the models have a simple structure and the number of variables is small.

Depending on the nature of the model associated with the metric, there are metrics that are determined based on linear or nonlinear functions. Including metrics in different classes ensures completeness for the performed analysis. It also highlightes the nature of the analysis based on the number of metrics used in various categories.

4. Software for assessing the orthogonality of derived entities

To assess the orthogonality of structured entities and of derived entities the ORTOES software product has been developed.

ORTOES application is implemented to allow a number of users to establish the orthogonality of the entities they generate, and it is divided into several modules, as shown in figure 2.

Each module is processing different types of entities.

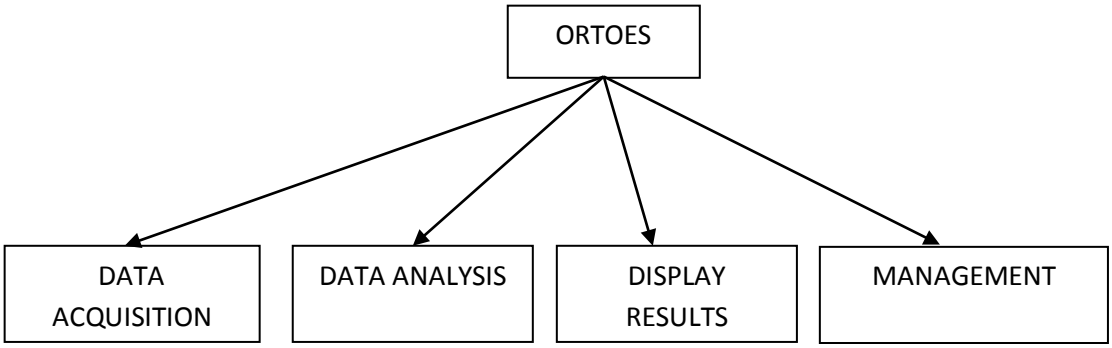

Figure 2 ORTOES software structure

Modules consist of several functions implemented to ensure processing and analysis of texts stored in a different way, based on several models.

The software determines a number of indicators on which it concludes on the originality of entities.

Text processing is done by filtering the words considered common and which affect the indicators' value. Words resulting from filtering are stored using arrays of queues. Dynamic structures are used because each text contains a variable number of terms. The software product processes the text entities using several criteria:

- identify the common words found in the texts;
- identify the degree of diversity of words used;
- identify the frequency of occurrence of terms in the text.

To achieve superior text processing functions were implemented functions that compare texts or take source files and transfer text components in dynamic structures.
Functions that acquire the texts focus on the category of symbols that separate the terms of texts. These symbols are stored in text files which are then inputted and stored by the software program. The source texts are processed character by character and according to

the characters' value the loading of the words in the dynamic structures are performed or the word forming process is continued.

The modules are implemented using the programming environment Visual C++, PHP programming language and for creating and accessing the database, the MySQL database management system is used.

To enhance the operability of the software product, the data are taken directly from text files and the display of the results is achieved also with the help of text files.

The modules are functional, being formed by general functions that are called for acquiring and processing of various source files containing structures complying with the arrangement of information specified in the criteria of file acquisition.

The program takes the data and based on the implemented functions provides a number of determinations:

- determining the number of distinct words;
- determining the number of words that repeat;
- determination of total words that appear in the article;
- determining the frequency of occurrence of words;
- calculating the orthogonality indicators.

The application functions are:

- creating the list of users;
- building access data assigned to each user (user name and password);
- acquisition of texts generated by each user;
- measurement of the orthogonality level on types of texts constructed by the users;
- determining the aggregate orthogonality corresponding to the types of texts processed;
- determination of average orthogonality for each user based on aggregate orthogonality calculated for each category of text;
- displaying the partial results, final, individual, general;
- reintroduction of entities generated saving the last entity generated, because the product program aims to increase the orthogonality generated in a period of time, has the role to assist the process of entities generation.

The administration of the application involves:

- the introduction of the user list;
- the introduction of accounts and passwords associated to the list of users; each user chooses an account and password with which he can access the application;
- allocation of unique numeric codes for each user; the allocation is made at the time the user data is inputted and not when the account is created;
- execution of the procedures for analyzing the level of orthogonality of entities;

- the display of structured entities entered and their level of orthogonality so that users whose entities do not meet the criterion of orthogonality should reintroduce the modified entities;
- the management of different application versions corresponding to the time intervals in which users access the application in order to transmit generated entities;
- manage messages sent to users, and display them either individual or in the form of lists containing the final results;
- storing the results concerning orthogonality of structured entities and ensuring their compatibility with the module that displays them;
- storing information about entities that have their orthogonality level below the threshold;
- generating results concerning the average orthogonality, the aggregated orthogonality, results provided for each user or for all;
- management of user accounts;
- generation of new passwords if it is desired;
- deleting an user account;
- identify the entities introduced by an user and viewing them.

Administration performed by users includes:

- define user account and password;
- view individual results, and also the final ones.

To ensure online security of the application that provides the facility to establish the orthogonality of structured entities generated by the users, the facilities offered by the MySQL database were used, the creation of users with unique credentials, storing their passwords in an encrypted format, and secondly the use of working sessions.
For each user who opens the online application, a separate work session is started, which gives protection from unauthorized attempts to access the application resources. Thus, the work session is terminated when the user leaves the current account or when a time of more than 5 minutes is elapsed, configurable, without the user using the application for the personal project.

Another implemented method for the security of the application is given by the function mysql_real_escape_string (string unescaped_string[, resource link_identifier]). It is used to ensure data before being sent as a request to the MySQL server by eliminating potentially dangerous characters inside the string.

Removal is done by adding backslash (\ x00, \ n \ r \, ', " and \ x1a), which forces MySQL to interpret the characters as characters with a single apostrophe only as part of the SQL statement.

The ORTOES application is built for automatizing the interaction with users. Firstly, the application administrator loads the users who have access to the application functions. Based on these records, the users create their accounts, load solutions, see the level of orthogonality. The passwords are automatically generated by the application and transmitted to the e-mail addresses of users.

5. Experimental results

ORTOES application is tested taking into account sets of data coming from the user community, data received at different moments of time, leading to variations in the number of users involved.

The initial community of users consists of 276 elements, of which for the structured entity a number of 259 users have uploaded values and for the derived entity a number of 246 users inputted values.

The orthogonality levels of structured and derived entities on range of values are shown in table 3.

Tabel no. 3 Membership of the orthogonality level on ranges of values

Entity	Orthogonality in the range of [0;0.75)	Orthogonality in the range of [0.75;0.85)	Orthogonality in the range of [0.85;1.00]
ES	227	0	32
ED	41	0	205

The low level of orthogonality of the structured and derived entities is caused by:

- taking over the names of entities from one user to another;
- defining initial project titles and derived in a strictly defined area of approach.

In table 4 the base titles commonly uploaded by the users:

Table no. 4 The frequency of occurrence of titles

Title	**Frequency**
Administrare baze de date	5
Afaceri in mediul Internet – Comerţ electronic	3
Agenda telefonică	2
Baze de date	8
Comerţ electronic	3
Dezvoltarea de afaceri electronice	3
Dezvoltarea afacerilor electronice în mediul comercial	3
Dezvoltarea unei aplicaţii utilizând platforma Java in sistemul Oracle	4
Dezvoltarea unui sistem informatic utilizând tehnologii de business intelligence	4
Evidenta membrilor unui club sportiv	3
Magazin virtual	10
Operaţii cu structuri de date	5
Proiectarea unui site	4
Realizarea unui sistem informatic	5
Securitatea bazelor de date	5

Sistem informatic pentru gestiune hotelieră	5
Tehnologii web	9

As shown in table 4, derived entities have a high level of orthogonality compared to basic entities, which is explained by the use of vocabulary with a high level of differentiation from one user to another. People use terms with a high degree of differentiation, which allows an approach with a high degree of originality.

In table 5 the orthogonality of derived entities is shown, computed by reference to basic entities:

Table no. 5 The level of orthogonality of derived entities

Orthogonality in the range of [0;0.75)	Orthogonality in the range of [0.75;0.85)	Orthogonality in the range of [0.85;1.00]
104	23	149

In table 6 it is shown the level of derived and respectively basic entities which have the orthogonality value of 0:

Table no. 5 ES and ED number with null orthogonality

No. ES	No. ED
227	41

Orthogonality is determined by reporting the terms of derived entities to the words of the entity considered basic. A low level of orthogonality of the derived entities indicates that they are built to highlight the properties of the basic entities.
So, as the number of entities that have orthogonality level below the 0.75 is higher, the more the derived entities achieve their purpose for which they were created, namely to help better define and build the basic entities.

6. Conclusions

The ORTOES application provides the processing of applications' source texts in order to determine their degree of orthogonality. Building applications with a high level of orthogonality and imposing restrictions for their field of membership as well as compliance with precise specifications, required to develop computer applications contribute to enhancing the homogeneity level of applications for better use of them by the people.

The primary goal of derived entities is the development of basic entities. Using the ORTOES software, the level of membership of the derived entities to the basic entities is determined. Derived entities are built using the same set of rules used to build basic structured entities. This certifies that identical comparison criteria are implemented with a high degree of application.

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