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TOWARDS SIMILARITY OF ELECTRONIC ATLASES: AN EMPIRICAL STUDY

Authors are solving the task to initiate investigations in the field of atlas similarity. Atlas similarity is needed for more appropriate modeling of macro-regional spatial systems which have comparable and un-comparable characteristics also as for the solution of other important tasks. Atlas similarity examples of four types were received by the empirical study: structure datalogical, subject datalogical, structure infological and subject infological. Datalogical notions can be associated with the atlas technological context; infological notions – with the atlas language context. Subject similarity can be associated with the map similarity; structural similarity – with the similarity of atlas relations. Experiments are made with the contents trees and several thematic maps of Atlas of Switzerland, National Atlas of Ukraine and Statistical Atlas of Switzerland. Web-application, demonstrating the results of the study, is created, published and available for the interested readers.

Keywords: *atlas similarity types: structure datalogical, subject datalogical, structure infological and subject infological; Atlas of Switzerland; National Atlas of Ukraine; Statistical Atlas of Switzerland.*

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ДО ПИТАННЯ ПОДІБНОСТІ ЕЛЕКТРОННИХ АТЛАСІВ: ЕМПІРИЧНЕ ДОСЛІДЖЕННЯ

Автори вирішують задачу ініціювання досліджень в області подібності атласів. Подібність атласів потрібна для більш адекватного моделювання макрорегіональних просторових систем, які мають порівнянні й непорівнянні характеристики, а також для вирішення інших важливих завдань. Емпіричним дослідженням було отримано приклади атласної подібності чотирьох типів: структурне даталогічне, предметне даталогічне, структурне інфологічне, предметне інфологічне. Даталогічні поняття можуть асоціюватися з технологічним контекстом атласу, інфологічні - з мовним контекстом атласу. Предметну подібність можна асоціювати з подібністю карт; структурну подібність - з подібністю атласних відношень. Експерименти виконано з деревами змісту і кількома тематичними картами Атласу Швейцарії, Національного атласу України і Статистичного атласу Швейцарії. Створено, опубліковано доступну для зацікавлених читачів веб-аплікацію з результатами дослідження.

Ключові слова: *типи атласної подібності: структурна даталогічна, предметна даталогічна, структурна інфологічна і предметна інфологічна; Атлас Швейцарії; Національний атлас України; Статистичний атлас Швейцарії.*

Introduction

"Paper atlases forever". Conclusions from Central library of Zurich excursion. ICA CoA-CET Commission Meeting Zurich, 1./2. Sept. 2016

At 01-Sep-2016 participants of ICA CoA-CET Commission Meeting visited the Zurich's Zentralbibliothek (meaning: Central library of Zurich). The librarian talked about paper atlases, which were created starting from the 15th century to the present days and are stored in the library. Herewith, even the atlases of the 15th and 16th centuries were shown. To the question 'does the library collect electronic atlases?' the answer was 'no'.

One reason for the negative answer has been named: 'a short-lived operability' of electronic atlases. It means that due to the rapid development of information technology, many electronic atlases lose their operability.

It may seem strange, but the problem of providing atlases operability can be solved by solving the problem of atlases similarity. Namely, let's imagine the following situation. There is the current implementation of the electronic atlas in a specific software environment. It is desirable to have similar (in some sense) electronic atlas, independent, or a little depending on the implementation of the software environment. In this case the problem would be solved by the representation of atlas elements in text formats instead of binary. For example, the maps can be presented in text open formats SVG or GeoJSON instead of binary and proprietary format.

In the article are described the initial results of empirical study of similarities which exist in three electronic atlases: Atlas of Switzerland, version 3, 2010 (released on DVD, AoS); National Atlas of Ukraine 2007/2010 (released on DVD, NAU) and Statistical Atlas of Switzerland (Internet based, https://www.atlas.bfs.admin.ch/, SAS). For the research the contents trees and several maps from the Religion theme were selected. By the empirical experiments we have identified four similarity types: structure datalogical, subject datalogical, structure infological, subject infological.

Overview of the useful facts from the similarity theory

In a common dictionary, the term *similarity* is typically defined as a quality of 'having characteristics in common' or being 'alike in substance or essentials' (Klir, 1985). According to this definition, two entities are considered similar if they are equal or, at least, comparable in some of their properties, but not necessarily in all of them. In addition, it is assumed that the properties in which the two entities are equal have some significance in a given context. Different kinds of similarities can thus be defined for a set of entities, depending upon the properties that are considered significant for a particular purpose.

The notion of similarity in relation to topographic maps is investigated in detail in monograph (Yan, Li, 2015). The authors carried out an overview of the definitions of the similarity notions in: geometry, computer science, engineering, psychology, chemistry, geography. For the geographical notion of similarity they gave own definition, using the terminology of set theory:

"Suppose that A_1 and A_2 are two objects in the geographic space. Their property sets are C_1 and C_2, and $C_1 \neq \Phi$ (Φ – empty set) and $C_2 \neq \Phi$. If $C_1 \cap C_2 = C_\cap \neq \Phi$, $C_\cap$ (∩ - intersection) is called the spatial similarity relations of object A_1 and object A_2." Such approach allowed to introduce the notion of the spatial similarity degree in the form of a real number in the range [0, 1], the value of which is determined by the normalized number of matching properties of two objects. The presented definition of the 'subject' similarity can be applied to thematic maps. Because the electronic atlases are cartographic systems, we also need the notion of 'system' similarity.

When a similarity relation is defined on a set of systems, it is usually referred to as a *modeling relation*. Two systems are similar if they preserve some common traits and can be transformed to each other by appropriate transformations applied to other traits (Klir, 1985).

In practice it is often an advantage (sometimes even a necessity) to deal with a problem in terms of a substitute system of some sort rather than the actual system for which the problem is formulated. The use of a suitable substitute system may be, for example, cheaper, faster, less dangerous, more convenient, and easier to understand or control, more precise, less controversial, or better adjusted to the human scale. Another example of the modeling relations usage can be found in the atlas systems development. It is even possible to say that the process of atlas systems development is sequential transformation of the more common source abstract systems into the final detailed target system at the end of the sequence. In these examples each couple of systems - the actual system and its substitute - must be similar in an appropriate and sufficiently strong sense with respect to the problem being solved.

Consider two systems, say S1 and S2, that are similar under a set of transformations applied to some of their traits. Assume that S1 is the system under investigation and S2 is a desirable substitute. Then, S1 is called the *original system* (or just the *original),* S2 is called a *modeling system,* and S2 together with the relevant transformations is called a *model* of S1. Whether or not the other system is suitable as a model of the original system is decided solely on pragmatic grounds. It is a decision made by the user. He is likely to accept the model as a substitute for the original if, in his opinion, it has clear advantages over the original and, at the same time, it is not worse than any of the available competing models.

Similarity and modeling in different fields of human activity are deeply investigated in (Kuneš, 2012). There are many useful facts there which can be used in atlas similarity investigations. For example, there are three similarity theorems (Kuneš, 2012) and their additional provisions (Venikov, 1976).

Motivation and structure of research

We have concentrated on three motivations and future uses of the results.

Motivation 1: Solving the problem of operability loss of atlas systems created in a specific computer environment. There are atlas systems (for example, National atlases) which should operate long period of time. Another problem is the usage of data and information from the old atlases, in the new atlases. Both problems can be solved if we will know meaning of atlas similarity. In this case we will have the possibility to transform similar characteristics of old atlas system into the new one. For example, it can be possible to create a modeling atlas system of an original atlas system, independent or a little depending on the specific realization environment. In this case, developers will be able to maintain up to date independent modeling atlas system. Atlas system depending on the specific computer environment will be created with a clear understanding of the limitations of a particular realization.

Motivation 2: Knowledge discovery in atlas cartography in particular, and in cartography in general. Similarity search process in atlas systems is comparable to the process of detection of hidden knowledge of atlas cartography. We also hope to find the similarity between the individual maps of atlas systems. Such knowledge will be useful in cartography in general. It is also important to note that the obtained initial knowledge about the similarity of atlas systems can initiate studies on the (machine) learning of 'ubiquitous' atlas systems in future. Here we mean the quite obvious appearance of virtual atlas systems that are created thanks to the massive spread of Web-cartography. The term 'neo-cartography' is often used to describe this phenomenon, which haven't yet scientific explanation. By analogy we can provisionally talk of an 'atlas neo-cartography'.

Motivation 3: Creation the distributed atlas systems or atlas networks. We suppose that the atlas systems are the best of currently known spatial models of country systems. There are also unions of several countries into the macro-regional country systems. The example of such temporal union is EU Strategy for the Danube Region (EUSDR, http://danube-region.eu, accessed 2017-feb-01). Such unions are created to access some goal. Management of such unions is impossible without knowledge of the spatial systems of the macro-region. In this case atlas networks can be the best spatial models of such systems. Therefore, the creation of macro-regional and global atlas distributed systems is clearly a useful task. The presence of these systems can help, for example, in addressing the challenges of sustainable development. Literally, how is it possible to address the challenges of sustainable development without the use of at least some general enough and practically applicable modeling systems? In our opinion, atlas network is just such a modeling system. At the same time we assume that the unitary modeling systems are not suitable solution. We need a federated distributed system, which takes into account both the similarity and difference between countries, and modeling systems. In this paper, most attention is paid to the similarity search for the future usage in construction of atlas networks.

In this research considered the similarity of systems of two types: physical and abstract. We will analyze four types of modeling relations (Table 1).

The structure of our research on the example of AoS and NAU atlases is shown on Fig. 1. Same figure can be shown for AoS and SAS. Notations: SSS – Switzerland Spatial System, USS Ukraine Spatial System, CanAoS (NAU, SAS) – Canonicalized AoS (NAU, SAS), SimAoS (NAU, SAS) – Similarized AoS (NAU, SAS), D – Datalogical level (or Datalogics), I – Infological level (or Infologics), U – Organizational level (or Usagelogics).

In Fig. 1 each modeling relation MR is shown by the unidirectional arrow. The arrow starts from the original system (S1) and is pointing on modeling system (S2); short record is S2=MR(S1). All relations MR1-MR4 in reality consist of a set of relations that exist between the elements of the systems. MR1 and MR2 relations on the left and right sides of Fig. 1 were used, when modeling systems AoS and NAU were developed. For example, AoS was developed by two MR: SDS=MR1(SSS) and AoS=MR2(SDS). MR1-MR4, SR3 and SR4 relations in the middle of Fig.1 were investigated in our research. SR means "similarity relation between systems in the case when modeling relation is not applicable"; short record is SR(CanAoS, CanNAU). Main difference between MR and SR is in studied object – MR supposed that studied object is the same for both systems: original and modeling. In SR studied objects are different: SSS and USS.

We are looking for some 'canonical' and 'similar' solutions. Term 'canonical' have several meanings. For example, in computer science, 'canonicalization' (sometimes 'standardization' or 'normalization') is "a process for converting data that has more than one possible representation into a 'standard', 'normal', or canonical form. This can be done to compare different representations for equivalence, to count the number of distinct data structures, to improve the efficiency of various algorithms by eliminating repeated calculations, or to make it possible to impose a meaningful sorting order." (https://en.wikipedia.org/wiki/Canonicalization, accessed 2016-oct-12). Term 'canonicalized' (notation 'Can') means: we have made some 'canonicalization', but 'canonical' element (for example, contents tree) is still open question. We are using similar to 'canonical'-'canonicalized' meanings for 'similar' and 'similarized' terms and notate 'similarized' by 'Sim'.

Each canonicalized atlas scheme – CanSDS, CanUDS or CanStSDS – was received by MR3 and MR1 relations. For example, CanSDS=MR1(AoS) was received by using: 1) source AoS element structure for transformation into canonicalized CanSDS element structure, 2) existed AoS element data for transferring

Table 1. Four types of modeling relations (MR) between original and modeling systems

Original system	Modeling system	Type	Example
Physical	Abstract	MR1	Atlas conceptual design scheme of some reality system
Abstract	Physical	MR2	Realization of conceptual design scheme in electronic atlas
Abstract	Abstract	MR3	Construction of 'canonicalized' atlas design scheme from existed atlas design schemes
Physical	Physical	MR4	Conversion of atlas realization 1 into atlas realization 2

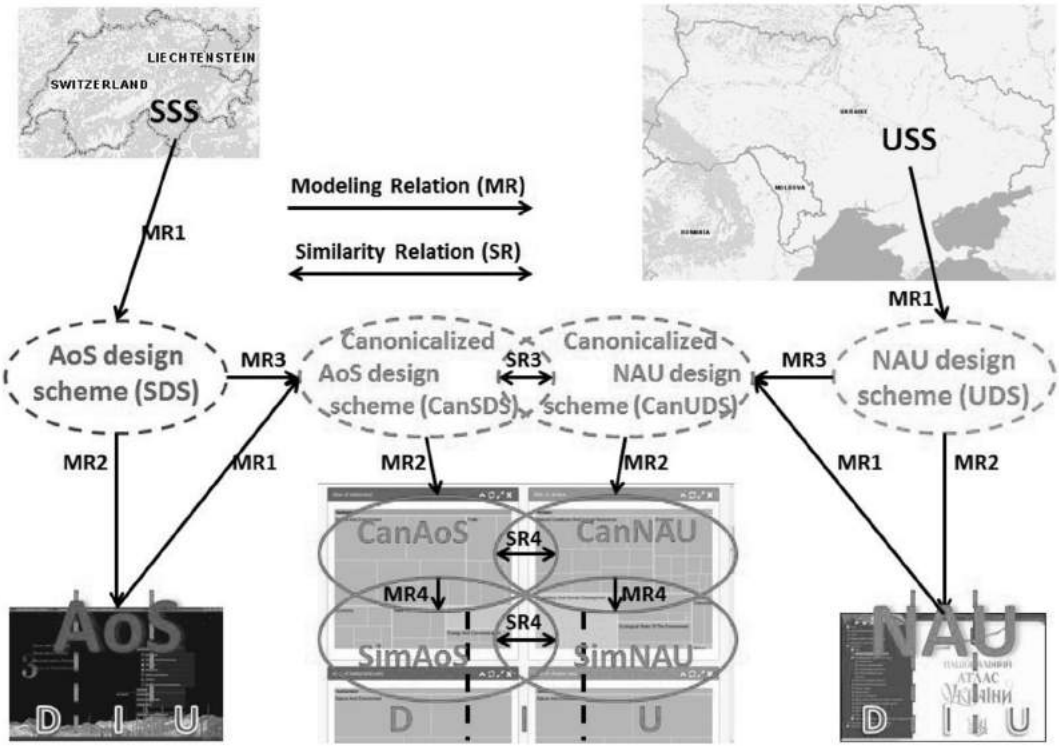


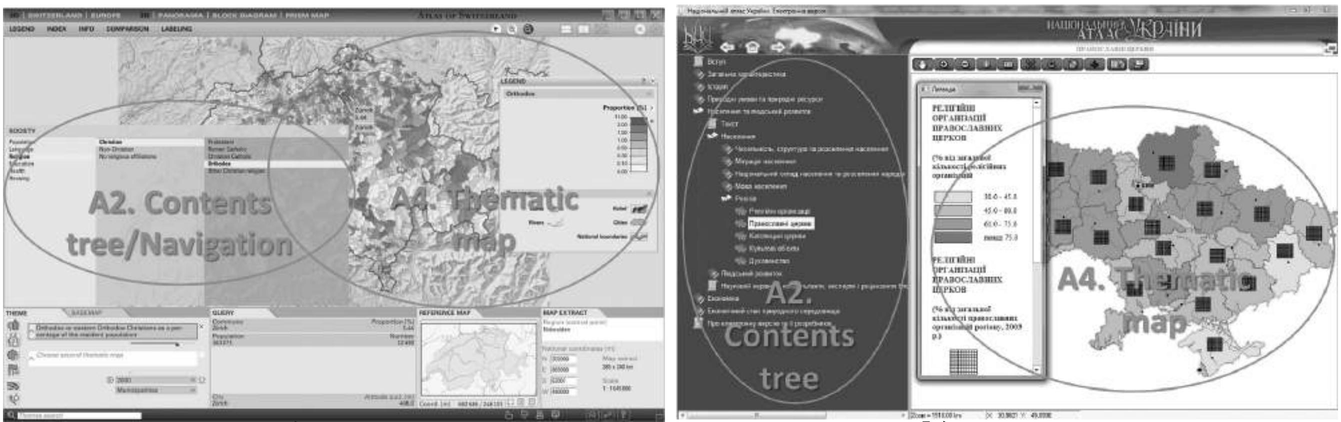
Figure 1. Structure of AoS and NAU (SAS) similarity search

into the modeling system CanSDS element data.

It is principal to note that we are concentrating on the search of so called 'operational' or 'constructive' similarity solutions. It means that solutions should be practical enough - close to the real implementation and immediate usage. Acceptable response on this request may be the tools, supporting similarity search. Taking into account practical realization we are using below implicitly very popular in computer industry Model-View-Controller (MVC) architectural pattern. Main attention is paid to the MVC Models. In some sense MVC Model can be associated with the 'Datalogics' of the atlas, and MVC View – with 'Infologics'. Notions of Datalogical level (Datalogics - D on Fig.1), Infological level (Infologics - I on Fig. 1), and Organizational level (Usagelogics - U on Fig. 1) for atlases are introduced in (Chabaniuk, Dyshlyk, 2015).

Datalogical similarity

Each atlas system consists of the following elements united by architecture: A1) user interface, A2) contents tree, A3) set of base maps (at least one), A4) set of thematic layers (or maps, depending on realization), A5) cartographic component, A6) non-cartographic content, A7) search, A8) view. Structure datalogical similarity was studied by the usage of A2 'contents tree' elements (Fig. 2). We are describing the whole chain of reasoning for this similarity type. Subject datalogical similarity was studied by the usage of several A4 'thematic maps' (Fig. 2). For this type of similarity we are presenting only final results in supporting Web-application.



a) b)

Figure 2. Examples of 'contents trees' and 'thematic maps': a) AoS - Orthodox Christian Religion, b) NAU - Orthodox churches of religion. Infologics

Description of contents tree realizations in compared atlases

We are describing only the Model parts realizations of contents trees in NAU, AoS and SAS. Shown below fragment of 'datalogical' level of NAU contents tree corresponds to the 'infological' level of NAU contents tree, shown on Fig. 2b. Model in NAU was part of XML-like file:

```
…
    <<Node>>
      Caption=Релігія (Religion)
      Frame=
      Url=
      ImageIndex=0
                                        →
    <<Node>>
      Caption=Релігійні організації (Religious Organizations)
      Frame=script
      Url=..\Maps\4067\ref_4067.htm
      ImageIndex=8
    <</Node>>
  …
```

Presented file consisted of two parts: Model and Formatting. They formed a single root tag <<Root>> (XML terminology is used). The Model part was formed by the following elements:

1. Each node of the Model (or Tree) was created by a pair of tags <<Node>> and <</Node>>. It was possible to create several nodes at one level of hierarchy. The nodes could contain attributes and other nodes.

2. The Node could have the following attributes: Caption – Node name, Url – content location, ImageIndex – icon, denoting type of Node contents, Frame – name of the HTML frame, in which the content will be visualized.

3. Tree Model was limited to a single tag pair <<Tree>><</Tree>>.

The Formatting part consisted of the <<Images>>, <<Font>>, <<Colors>> tags and supporting files. Attributes of tags, for example <<Font>>, have allowed setting the font name, size, coding table, style and font color. The Formatting can be associated with the View, but only with its 'datalogical' part. Infological part of View was responsibility of developer, not software. Contents tree Controller was realized as ActiveX control. Controller was embedded into the HTML-page and had worked when the page was downloaded into the Internet Explorer browser.

As for AoS, at first glance it seems that contents tree is missing. We assume that the term 'navigation' is used instead, and may be included in some way in the element A1 'user interface'. Below we want to show that the contents tree is presented in AoS.

Let's start with the fact that through the 2D MAPS part of AoS user can navigate to the maps blocks: 1) Basemap, 2) Nature and Environment, 3) Society, 4) Economy, 5) State and Politics, 6) Traffic, 7) Energy and Communication. If select on the AoS start page, for example, 2D Maps/Society, the user is provided with an interface for select the map from section/subsection/maps of Society maps block. We have chosen Religion/Christian/Orthodox map (Fig. 2a).

Similar navigation was made in NAU (Fig. 2b). There are following NAU maps blocks: 1) General characteristics, 2) History, 3) Natural conditions and natural resources, 4) Population and human development, 5) Economy, 6) Ecological state of the environment.

We chose a similar to AoS example from NAU block/section/subsection/maps - Population and human development/Population/Religion/Christian/Orthodox churches. Please note that the interface of NAU contents tree displays the full contents hierarchy in the same window. Besides that, access to the basemap by the contents tree is not possible. In AoS access to the blocks and sections of maps is separated into different windows.

Some differences should be noted in the implementation of the user interfaces of the AoS and NAU. Thus, in the NAU it is possible to remove contents tree completely and to expand the map window to the full screen. In the AoS it is possible to remove only part of the contents tree, responsible for the sections of maps and displayed in the map window. Part of the contents tree, responsible for the managing of maps blocks, cannot be removed.

In addition to the presented on Fig. 2 'infologics' of AoS contents trees, we have analyzed 'datalogics' of AoS contents tree. It is set of XML-based files, which are describing the properties of the map shown in Fig. 2a.

As for contents tree realization in SAS (https://www.atlas.bfs.admin.ch/) we can conclude that its Model part is a subset of NAU Model part. Formatting possibilities in SAS are very simple: open/close icons for branches and unique icon for the leaf/map. The main difference in the implementation of the Controller, where Adobe Flash was used.

Datalogical similarity of contents trees

Based on information, presented above, we have received canonicalized conceptual contents tree model. Conceptual contents tree model was used to receive logical contents tree model. Canonicalized logical contents tree model was used to receive described in this subsection canonicalized logical contents tree schemes of NAU, AoS and SAS. Taking into account volume restrictions of this article we are presenting only short fragments of so called applied Models. These Models, or logical schemes, are realized ascanonicalized XML trees. Modelling relations between source and target are MR3 and MR1.

build the layout, consisting of any number of visual elements of arbitrary sizes and design styles.

Model part of Canonicalized NAU logical design scheme CanUDS is XML file, with English translation of Ukrainian parts:	Model part of Canonicalized AoS logical design scheme CanSDS is XML file, with English translation of German parts:	Model part of Canonicalized SAS logical design scheme is XML file, with English translation of German parts:
… <branch id=»b040105»> <branchTitle>Religion</branch Title> <branchDescription/> <branchLink/> <branchType>0</branchType> <leaf> <leafTitle>Religious organizations </leafTitle> <leafDescription/> <leafLink>../maps/NAU_AoS / index_Percent_NAU.html</leafLink> <leafType>8</leafType> </leaf> …	… <branch id=”b0203”> <branchTitle>Religion</branchTitle> <branchDescription/> <branchLink/> <branchType>1</branchType> <branch id=”b020301”> <branchTitle>Christian</branchTitle> <branchDescription/> <branchLink/> <branchType>1</branchType> … <leaf> <leafTitle>Roman Catholic</leaf Title> <leafDescription/> <leafLink>../maps/NAU_AoS /index_ RomanCatholic_AoS .html</leafLink> <leafType>3</leafType> </leaf> …	… <branch id=”b010101”> <branchTitle>Religion</branchTitle> <branchDescription/> <branchLink/> <branchType>1</branchType> … <branch id=”b01010103”> <branchTitle>Roman Catholic< / branchTitle> <branchDescription/> <branchLink/> <branchType>1</branchType> <leaf> <leafTitle>2010</leafTitle> <leafDescription/> <leafLink>../maps/AoS_SAS/ index_RomanCatholic_SAS.html</leafLink> <leafType>5</leafType> </leaf> …

Similar chain of reasoning can be made for thematic maps with the appropriate changes of Model, View and Controller. For example, we have used GeoJSON format for the canonicalization of thematic maps. The final results are presented in supporting application and on figures below. We can conclude that subject datalogical similarity exists for all studied thematic maps and atlases.

It is clear that CanSDS and CanUDS are similar in datalogical sense. It means they are constructed on the same canonicalized conceptual and logical datalogical design models. This similarity is shown as SR3(CanSDS, CanUDS) on Fig. 1. Same is truth for similarity relations of CanSDS and SAS canonicalized logical design scheme CanStSDS. SR4(CanAoS, CanSAS) similarity, shown at the bottom of Fig. 1, is realized in supporting Web-application (see description of application below).

Search of Infological similarity

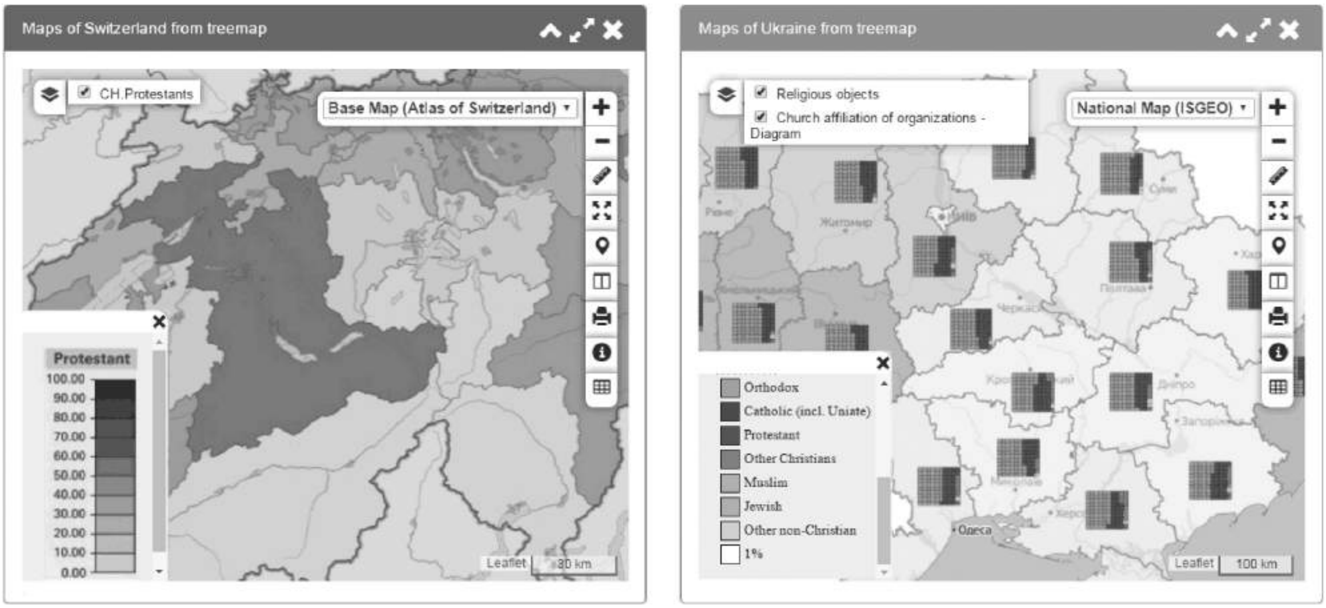
To find the Infological similarity it was constructed the supporting Web-application with the usage of so called AtlO Atlas shell. The result is published at http://atlo-simtrees.isgeo.com.ua/. AtlO has two principal specifics useful for this application: Bootstrap framework based user interface and treemaps as complement of ‘usual’ trees. Bootstrap framework allows creation of adaptive interfaces using screen division on the grid that consists of 12 flexible columns within each new row. With this grid, we are able to

Treemap is a method for visualizing hierarchically structured information (Johnson, Shneiderman, 1991). Comparing with the ‘usual’ contents tree, treemap contents tree gave us additional possibilities:

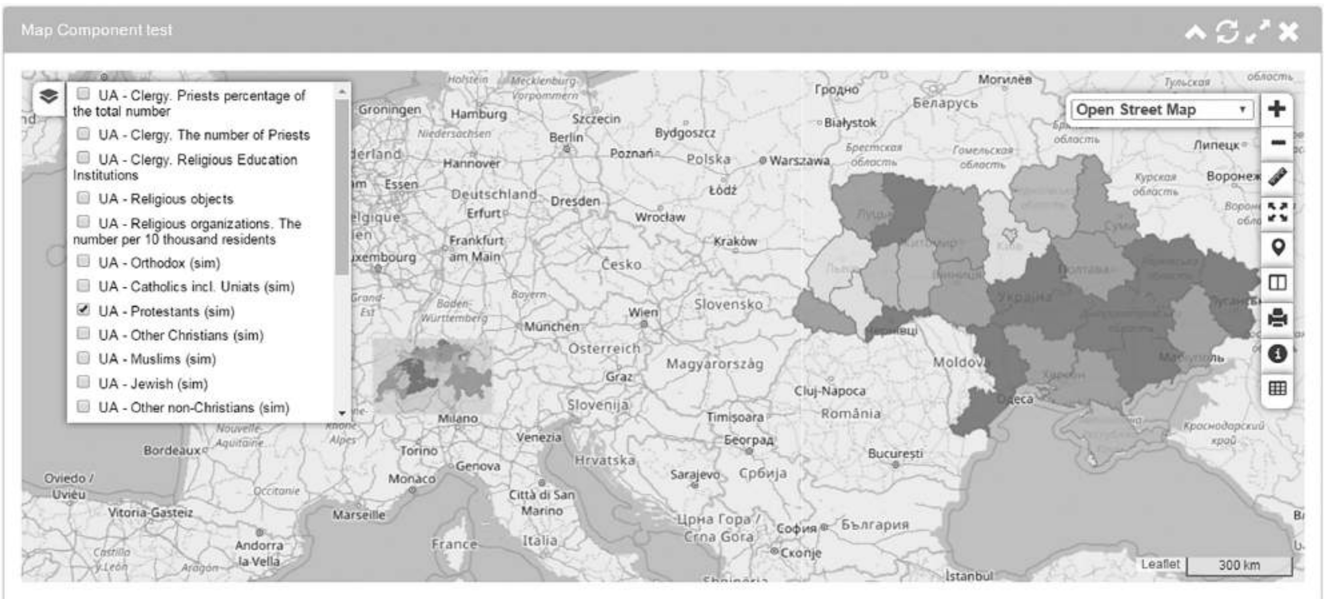
- Technique for ‘complete’ presentation of modeled reality phenomenon like Switzerland Spatial System (SSS) – modeling system should be presented in ‘complete’ rectangle with proportional in some sense sub-rectangles. For example (see supporting Web-application), treemap presentation of atlas structure give us much more information comparing with ‘usual’ contents tree.
- Rectangle size. Size of (sub)-rectangle (e.g., Nature and Environment) in presented example is showing percent of Nature and Environment maps in AoS. This percent is received by dividing of number of Nature and Environment maps on total number of maps in AoS. The value, characterizing the leaf, can be different from “1” (as in described example), so we can change the ‘weight’ of map (leaf) in AoS (treemap).
- Rectangle color. In the supporting Web-application color is used for identifying the availability of maps in colored sub-rectangle (sub-section). But color can be used also for other goals. For example, for comparison per capita incomes in Switzerland and Ukraine in appropriate maps.

The simplest way to define infological similarity of atlases is to extend described above subject similarity from (Yan, Li, 2015). Suppose that S1 and S2 are two spatial systems in the spatial space, modeled by atlases. The examples of such spatial systems are SSS and USS. They are modeled by AoS and NAU atlases. Thematic maps set of modeling atlas systems are M1 and M2, and M1≠Φ and M2≠Φ. If $M1 \cap M2 = M_{\cap} \neq \Phi$, $M_{\cap}$ can be called the atlas subject similarity relations of spatial systems S1 and S2 also as modeling atlas systems. Such approach allow to introduce the concept of the spatial (and atlas) system subject similarity degree in the form of a real number in the range [0, 1], the value of which is determined by the normalized number of matching thematic maps of two atlas systems.

Following (Yan, Li, 2015), the proposed method could be generalized to thematic maps, consisting of several thematic layers. Unfortunately, in the case of AoS and NAU, this method does not work well as thematic maps of these atlases were created primarily on significantly different statistical systems of Switzerland and Ukraine. Therefore number of 'similar' thematic maps is so small that the subject similarity degree is close to 0. Shortly it can be concluded as: "Religion exists in both atlases, but similar thematic maps do not exist". A definite way out of this situation is the 'similarization' of thematic maps. An example of such



a)



b)

Figure 3. 'Protestants' thematic map in NAU: a) before similarization, b) after similarization

map similarization is presented. It is the example of so-called 'subject infological similarity'.

Another solution is the introduction of additional similarity criteria, which would seek a so-called structure infological similarity. It is to find acceptable for atlas pairs unique classification scheme followed by its application to the 'similarization' atlas structures. Example of such AoS and NAU similarization is presented in supporting Web-application.

In the case of subject infological similarity search it is needed to say following. AoS realizes simple map design for self-explanatory representations such as choropleth maps. In contrast, NAU contains many complex maps and as a consequence a lot of ways to display them. Through the using of background color plus symbols plus many diagrams for the same map achieved showing of the phenomenon at whole.

As an example, we have examined Religions maps. The Religions section in AoS contains 3 subsections with 9 maps in total which show proportion of religious people as a percentage of residents by administrative units. As for NAU, the one map shows the proportion of religious organizations (communities) in the regions of Ukraine in the form of a square diagrams with weighs cells 1%. But both atlases maps are presenting the predominance of religions on territories which are comparable by subordination and size.

However, there is the difficulty to compare the related topics on the maps when one map shows indices with a choropleth, and the other one use the diagram. Therefore, it was made canonicalization of maps into the GeoJSON-based choropleth map structures. Second step was similarization of NAU map infologics into the AoS map infologics. As result, the new map style is aligned with the legend of the proper map from the AoS and can be compared to it (Fig. 3).

Conclusions

The article shows availability of four similarity types in Atlas of Switzerland, National Atlas of Ukraine and Statistical Atlas of Switzerland: structure datalogical, subject datalogical, structure infological and subject infological. Structure and subject datalogical similarities are proven by transformation of compared elements into the canonicalized form. These datalogical notions can be associated with technological contexts of atlases. It is possible to conclude that 'comparable' parts of AoS, NAU and SAS can be transformed into the datalogically similar atlases. The problem is with the notion, noted by the term 'comparable'.

Term 'comparable' includes atlas infologics. In this article we demonstrated only availability of structure infological and subject infological similarities. Infological notions form Infological level of atlases. This level can be associated with (or named by) Language context. It is clear that we need as minimum two interrelated infological languages: map language and atlas language. Unfortunately map languages are not popular in cartography. Sometimes cartographers even don't think about language, which they are using. These map languages are not formalized, so we don't have possibility to compare them. We also don't have possibility to compare scientifically (based on some theory) 'sentences', constructed on un-formal map languages. An atlas language does not exist.

But we expect that our work clearly shows the directions of possible research as well as problems that must be solved in the field of atlas similarity.

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