Two Methods of Analysis for Huntington's 'Clash of Civilizations'

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The paper presents two methods for civilizations' identification developed for analysis of Samuel Huntington's concept about the 'clash of civilizations' with the help of mathematical methods. General origin and formalization of the problem, theoretical structure of the methods, and the approach for further interconnection of the results with global conflict dynamics are given.

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Introduction

The disintegration of USSR in 1991 completed the collapse of the bipolar world order that had existed to that moment. Thus, world entered a transition mode in search for the new model of the geopolitical stability that could correspond a new balance of powers on the planet. That stimulated the appearance of many new theories and approaches that describe post-Cold War world.

The most arguable and interesting for further investigation is a concept brought by Samuel Huntington [1, 2] about the 'clash of civilizations'. In his concept Huntington claims that spatial neighborhood of civilizations frequently brings them to confrontations or even conflicts. Such conflicts can usually happen at the joints or fuzzily defined borders ('fault lines') of civilizations.

Though geopolitics is traditionally based on qualitative methods, studies of world dynamics [3, 4] and world cultures [5], give a new challenge for application of mathematical methods to the study of global social processes. Given paper represents the research focused on development of methodology for testing and investigation of the 'clash of civilizations' concept with the use of mathematical methods of analysis.

Problem definition

Huntington conclusions about the 'clash of civilizations' can be split in two parts, and each of them can be treated as hypothesis:

H1. *The great divisions among humankind and the dominating source of conflict will be cultural.*

H2. *The fault lines between civilizations will be the battle lines of the future.*

Our aim was to adjust existing and develop new mathematical methods of analysis for evaluation of the contemporary civilizational structure of the world and testing mentioned hypotheses.

First of all, a subject of study should be defined.

Term 'civilization' has many various definitions that are a topic for many social science disputes. To be correct let's note that under 'civilization' we understand localized in time and space society that is a sub-system of the global culture of the highest level. Actually civilizations are big conglomerates of the countries that have common determining features (culture, language, religion etc.). Thus in simplified case it's rational to use countries as basic elements of the civilization:

$$World = \bigcup Civilizations = \bigcup \bigcup Countries \qquad (1)$$

Taking into account the complexity of the studied systems and problems with the use of formal models to

get real knowledge about the global cultures, expert surveys are recognized as prior source for the needed input, though 'indirect' method proposed further can be used for any kind of data with 'object-value' structure.

Cultures differentiation

One can be easily confused with pluralism of key culture features determining civilizations. In pilot research R1 we differentiated cultures in a multi-dimensional space using a set of criteria developed by the group of experts using modified Delphi method [6]. For further research it's proposed to develop criteria framework using the approaches for mapping cultural patterns brought by European Social Survey [7].

Methods of civilizations' identification

To check hypothesis H1 it is needed to identify the civilization structure of the world (civilizations and fault lines between them). For that two methods of civilization identification ('direct' and 'indirect') were developed.

'Direct' method

This method is based on the idea that experts can formulate existing civilizations by their own and implies following scheme of research:

1. Experts fill in the survey form in which each expert proposes his or her own world civilization structure through naming civilizations and their countries--members (as it is described by (1)).
2. For civilization structures provided by the experts a similarity distance is calculated using the Jaccard similarity distance:

$$d_{Jaccard}(A,B)=1-J(A,B)=1-\frac{|A \cap B|}{|A \cup B|} \quad (2)$$

3. Applying the hierarchical method of clusterization to expert data a single world civilization structure is obtained.
4. Using the initial survey data and derived civilization structure a grade of membership to civilizations for the countries is introduced and computed:

$$\mu_c(x): x \rightarrow [0;1], x \in \{countries\}, c \in \{civilizations\} \quad (3)$$

5. By implementing different thresholds for $\mu_c(x)$ core countries and fault lines can be obtained.

'Indirect' method

This method is based on the idea that experts deal only with countries as objects of their assessment and represents following scheme of research:

1. Experts fill in the survey form in which each expert provides pairwise country comparison for each criteria selected according to 1.1:

$$dif_k^e(a,b) \in \mathbf{Z}_n, dif_k^e(a,b) = dif_k^e(b,a)$$
$$a,b \in \{countries\}, k \in \{criterion\}, e \in \{experts\} \quad (4)$$

2. Expert data about countries differences is normalized using logistic norm:

$$\|x\| = \frac{1}{1+e^{-\frac{x-\bar{x}}{\sigma}}} \quad (5)$$

3. Normalized data is aggregated to the single country pairwise difference matrix:

$$D = \{d(a,b)\} = \begin{pmatrix} 1 & \dots & d(1,n) \\ \vdots & \ddots & \vdots \\ 0 & \dots & 1 \end{pmatrix} \quad (6)$$

4. Applying fuzzy c-means clusterization method to matrix of distances D one gets country clusters which will actually represent civilizations, with grades of membership to civilizations for each country.
5. By analogue to 'direct' method.

The crucial advantage of this method is more feasible and clear for assessment objects like countries and cultural values, but the average number of expert estimates is significantly higher.

Hypotheses test

To complete the test of hypothesis H1 it is supposed to held comparative analysis of civilization structures and fault lines computed with two methods with those one identified by S. Hantington. The final conclusion can be made based on similarity of examined civilization structures and the coincidences of the fault lines.

To check the hypothesis H2 it is proposed to compare the locations of the fault lines with the world conflicts, analyze its correlation and dynamics. Conflict analysis can be done on the basis of approaches published in [8, 9] and the data published by Centre for the Study of Civil War (CSCW) at Peace Research Institute Oslo (PRIO) together with Uppsala Conflict Data Program (UCDP) at the Department of Peace and Conflict Research, Uppsala University (http://www.prio.no/CSCW/Datasets/Armed-Conflict/).

Conclusions

Current paper represents the main ideas for analysis of Samuel Huntington's 'clash of civilizations' in the research that is being continued by the author:

1. Two main hypotheses for further analysis were selected: about the world cultures identifying the main divisions between the humankind, and the conflicts that take place at the fault lines of theses cultures.
2. General approach for mathematical formalization of the studied problem was proposed.

3. Two methods for civilizations' identification were described and the short overview for the conflict hypothesis test procedure was given.

Developed methodology can be adapted to be used in different social system studies that require numerical assessment.

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