

ABSTRACT

The thesis is presented in 78 pages. It contains 3 appendixes and bibliography of 50 references. 20 figures and 13 tables are given in the thesis.

Topic relevance. The problem of analysing large amounts of related data emerges in various areas, such as: organizational management, information security, computer linguistics, sociology, etc. For this purpose, data is often presented as a network to be transformed in order to detect hidden patterns, topology features, central nodes, etc. Depending on the area of research, it allows to identify key persons in the organization and sources of information leakage, to form domain knowledge models, to distinguish the main concepts in the texts and so on. The necessity to form dictionaries, thesauri and ontologies which can be used to analyze semantic networks and to create enhanced classification systems might also emerge in the area of computational linguistics.

Thesis connection to scientific programs, plans, and topics. The thesis was prepared according to the scientific research plan of the Applied Mathematics Department of the National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute.”

Research goal and objectives. The goal of this thesis is the development of a domain knowledge hierarchical models formation method based on language network nodes centrality research.

To accomplish this goal, the following objectives were reached:

- to systemize existing information networks research methods;
- to develop a domain knowledge hierarchical models formation method based on central nodes detection;
- to accomplish experimental research using real language networks from different areas.

Object of research is quasi-hierarchical networks analysis process.

Subject of research is the methodology of the forest extraction from a quasi-hierarchical language network, graph theory methods, network analysis methods.

Methods of research. To solve the task, the following methods were used: graph theory methods, cluster analysis methods, multi-objective assessment methods (to determine central nodes); graph theory methods (to develop a domain knowledge models formation method).

Scientific contribution consists of the following:

- the central nodes determination methods were enhanced in order to increase accuracy of obtained results;
- the domain knowledge hierarchical models formation method based on language network nodes centrality research by the forest extraction from an initial quasi-hierarchical language network.

Practical value of obtained results. The proposed domain knowledge hierarchical models formation method might be used as a foundation for thesaurus and ontologies creation as well as classification systems.

Approbation of the thesis results. Basic ideas and results of the research were presented at the conference «Applied Mathematics and Computing» (AMC-2017).

Publications. Thesis results are published in 7 scientific works:

- in 2 papers in scientific journals included in the List of Professional Scientific Journals of Ukraine (technical sciences);
- in 5 papers in proceedings of international scientific conferences.

Keywords: hierarchical networks, centrality criteria, multi-objective assessment, domain knowledge, language network.