

# Dissertation Review

**Dissertation Topic:** „An Automated System for Analysis of Online Communication with Customers based on Machine Learning and Natural Language Processing - Structure, Development and Business Applications”  
for the award of educational and scientific degree “Doctor”  
Professional field: 3.8. Economics

**Dissertation Author:** Assist. Prof. Gloria Ventsislavova Hristova

**Scientific Supervisor:** Assoc. Prof. Boryana Pelova

**Reviewer:** Prof. George Chobanov, Dr. Sc.

The dissertation submitted for review has a volume of 281 pages and contains an introduction, three chapters, a conclusion, an author’s reference for dissertation contributions, a list of publications, a reference for approbation of the results and a bibliography.

The volume and structure of the submitted dissertation correspond to the requirements of the Higher Education Act, Law on the Development of Academic Staff in the Republic of Bulgaria, The Ordinance on the State Requirements for the Admission and Training of Doctoral Students, Organization and activity regulations of the Sofia University “St. Kliment Ohridski”, The Rules on the Conditions and Procedure for Acquiring Science Degrees and Holding Academic Positions in Sofia University “St. Kliment Ohridski” and decisions of the Academic Council in this regard.

The presented research is up-to-date and contributes to the development of online communication analysis techniques based on machine learning and natural language processing.

The introduction has a volume of 18 pages and presents in detail the topic of the dissertation, the main research tasks and dissertation structure.

The author defines the object of the research - analysis of textual data in Bulgarian. Introduced by a brief literature review of current scientific publications, the main aim of the dissertation is defined as follows:

Development of an automated system for the analysis of both the main topics of client interest, as well as customer satisfaction with the services provided in a contact center in which communication is in Bulgarian.

Based on this, the subject of the dissertation is defined as follows:

Main topics of client interest, as well as customer satisfaction with contact center chat services.

The first chapter has a volume of 90 pages and presents a detailed description of the research object, an introduction to the proposed methodology and a critical literature review of current scientific publications.

Based on the findings made as a result from the conducted critical literature review, analysis and synthesis in Chapter I of the dissertation the following research objectives are formulated:

I. Conducting a critical literature review, analysis and synthesis in the following three areas of research interest:

I.1. Methodical literature review with respect to the object of the dissertation - online chat communication with clients carried out in a contact center.

I.2. Extensive literature review of research focused on the analysis of textual data in Bulgarian - development in the field and practical applications.

I.3. Methodical literature review with respect to the subject of the dissertation – topic modeling and customer satisfaction/sentiment analysis.

II. Development of an automated system for analysis of online communication with customers based on machine learning and natural language processing. Focus is put on the structure and development of the system:

II.1. Development of a research method for structuring and processing of the studied type of data.

II.2. Development of a research method for extraction of the main topics of client interest.

II.3. Development of a research method for the analysis of customer satisfaction with contact center chat services.

III. Empirical testing and practical application of the developed system on a sample of data part of a real business case. Focus is put on the business applications of the system:

III.1. Formulation of clear and specific recommendations for the possible ways in which the knowledge extracted from the studied type of data could be useful for the business.

III.2. Outlining opportunities for improvement of the developed system and future perspectives.

The following scientific contribution is made within Chapter I:

Development of an extensive literature resource presenting an up-to-date picture of the development in the field of natural language processing in Bulgaria, as well as the opportunities for analyzing textual data in Bulgarian.

The second chapter has a volume of 65 pages and defines in detail the methodology developed in order to achieve the main goal of the dissertation. The author describes in detail the applied algorithm for processing the data, as well as the analytical techniques used in order to extract the main topics of customer interest and satisfaction/sentiment analysis. The scientific contributions made in Chapter II include the development of a methodology for the analysis of online chat communication with customers conducted in the Bulgarian language, as well as development of an automated approach for knowledge extraction from such type of data. Within the dissertation is developed a research method for analyzing the topics of client interest, as well as a research method for predicting customer satisfaction with online chat communication in a contact center.

In Chapter III, which has a volume of 70 pages, the automated analysis system is tested empirically on real data (in the context of a specific business case). In Chapter III is developed a research method for interpretation of the obtained results, characterized by applicability and possible extrapolation of its steps. The possibility to adapt the developed automated system to new data and to update the information in real time could be considered an additional contribution of the dissertation.

The author's reference for the scientific contributions in the dissertation of Assist. Prof. Gloria Hristova fully corresponds to the results obtained by her.

The topic developed by Assist. Prof. Gloria Hristova is extremely up-to-date and of undoubted scientific and scientific-applied significance. The author has made a comprehensive literature review of current scientific publications on the subject. The obtained results demonstrate new and different angle in the analysis of textual data. Assumed inaccuracies do not reduce the value of the proposed research.

### **Conclusion**

The proposed for defense dissertation of Assist. Prof. Gloria Hristova contains significant scientific contributions and meets the requirements of the Law on the Development of Academic Staff in the Republic of Bulgaria. This gives me the reason to propose to the scientific jury to award Assist. Prof. Gloria Ventsislavova Hristova the educational and scientific degree "Doctor" in professional field 3.8 Economics.

Sofia  
22.08.2022

Reviewer: