DISSERTATION STATEMENT

on a dissertation for the acquisition of an educational and scientific degree "doctor"

Professional Direction: 4.6 Informatics and Computer Science

Scientific Specialty: Informatics

Author of the Dissertation: Emiliano Maksim Mankolli

Dissertation Topic: OPTIMIZATION METHODS FOR MACHINE LEARNING APPLICATIONS

The statement was crafted by ***Professor PhD Desislava Antonova Ivanova*** from TU-Sofia, FAMI, Department of Informatics, in my role as a member of the academic committee, in accordance with the directives outlined in Order No. 319/06.12.2023.

1. **General characteristics of the dissertation work and the presented materials.**

The dissertation is 138 pages long, including 16 figures and 5 tables. A total of 131 literary sources are cited.

The dissertation presents a comprehensive overview of the latest advances in ML and NLP. These fields are at the forefront of technological development, especially in recruitment. The aim is to provide a detailed overview of the current state of the art, highlighting the most innovative and impactful developments in these areas. The following chapters of the dissertation present innovative techniques and approaches for optimizing accuracy and efficiency in job similarity, as well as predictive models and candidate selection strategy. The presented materials related to the dissertation show that Emiliano Mankolli has excellent training in the field and knows the problem area.

2. **Content analysis of the candidate's scientific and scientific-applied contributions, contained in the presented dissertation work and the publications to it, included in the procedure.**

The research presented by Emiliano Mankolli offers contributions in the field of optimizing the recruitment process using artificial intelligence. The carried-out content analysis of the

contributions in the dissertation work and the publications to it give me reason to accept them formulated as five scientific and two scientific-applied contributions.

Scientific contributions:

1) Analysis of the application of Machine Learning (ML) and Natural Language Processing (NLP) techniques in the recruitment industry.
2) Suggested approach: Combination of Word2vec and the SVM method, with the aim of creating a system that could systematically analyse a pool of candidates and match their qualifications with job titles and industry-specific details.
3) Suggested approach: Combination of BERT and XGBoost method, with the goal of further elevating precision in identifying job title similarities.
4) Suggested holistic evaluation approach in recruitment for identifying candidates' potential for success.
5) Formulated Job success prediction model.

Scientific-applied contributions:

6) An "Applicant Pool Optimization Algorithm: Exploiting Job Similarity for Efficient Recruitment" is proposed.
7) An "Advanced Hybrid Method for Reducing Run Time and Memory Consumption Using BERT and XGBoost Models" is proposed.

The dissertation provides new opportunities for the development of the recruitment industry, in line with the changes in the globalization of the labour market and the technological progress of society, based on methods and tools using artificial intelligence.

3. Approbation of the results.

Emiliano Maksim Mankolli presented 5 publications related to the dissertation. All publications are presented at reputable scientific forums. All five publications are indexed in the world scientometric database "Scopus", with 6 citations noted in the same database. The publications presented by Emiliano Mankolli fully cover and many times exceed the requirements for obtaining the educational and scientific degree "Doctor" in PF 4.6 "Informatics and Computer Science".

4. Qualities of abstract.

The abstract meets the requirements and contains the main information and accurately and clearly reflects the contributions in the dissertation work.

5. Critical notes and recommendations.

The dissertation has a good balance between theoretical and experimental parts.

I have a question:

How would you summarize the benefits of your improved AI recruiting methods and models compared to existing solutions?

6. Conclusion.

After reviewing the dissertation and accompanying scientific works, and assessing their significance along with the scientific and scientific-applied contributions they offer, I hereby affirm that the presented dissertation, its associated scientific publications, and the quality and originality of the results and achievements within them align with the stipulations of ZRASRB, its application guidelines, and the relevant regulations of BAS governing the attainment of the educational and scientific degree "doctor" in the field of 4.6 Informatics and Computer Science, specifically in the scientific specialty of Informatics, as presented by candidate Emiliano Maksim Mankolli.

Notably, the candidate fulfils the minimum national requirements in the professional domain, and there is no evidence of plagiarism in the submitted scientific works for the competition.

Given the aforementioned considerations, I propose that the academic committee confer upon Emiliano Maksim Mankolli the academic and scientific title of "Doctor" in the field of 4.6 Informatics and Computer Science, with a scientific specialty in Informatics.

Date: 15.02.2024

Reviewer: На основание ЗЗЛД