

**A SEMANTIC INFORMATION RETRIEVAL APPROACH TO SOLVING  
PAPER-REVIEWER ASSIGNMENT PROBLEM USING A NEURAL NETWORK  
LANGUAGE MODEL**

**BY**

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**(15PCG01035)**

**A DISSERTATION SUBMITTED IN THE DEPARTMENT OF COMPUTER AND  
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**IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD  
OF MASTER OF SCIENCE DEGREE IN COMPUTER SCIENCE.**

**JUNE, 2017**

## ACCEPTANCE

This is to attest that this dissertation is accepted in partial fulfillment of the requirements for the award of Masters of Science degree in Computer Science in the Department of Computer and Information Science, College of Science and Technology, Covenant University, Ota, Ogun State.

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### **DECLARATION**

I hereby declare that Ogunleye, Olawole Moses with matriculation number 15PCG01035, carried out this research entitled “A Semantic Information Retrieval Approach to Solving Paper-Reviewer Assignment Problem Using a Neural Network Language Model”. The project is centered on an original study in the department of Computer and Information Sciences, College of Science and Technology, Covenant University, Ota, under the supervision of Dr. Adebisi Ayodele. Concepts of this research project are results of the research carried out by Ogunleye, Olawole Moses and ideas of other researchers have been fully recognized.

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## CERTIFICATION

This is to certify that this research entitled “**A Semantic Information Retrieval Approach to Solving Paper-Reviewer Assignment Problem Using a Neural Network Language Model**” was carried out by Olawole Moses Ogunleye with matriculation number 15PCG01035 under our supervision and approved by us:

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## **DEDICATION**

I dedicate this project to God Almighty for His sufficient grace, wisdom and knowledge given to me throughout my Master's Degree Programme.

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## **ABSTRACT**

The task of assigning papers to reviewers is crucial to the realisation of an effective peer review of academic conferences and journal articles. For an excellent performance of the reviewers, it is important that the papers assigned to them are related to their knowledge domain. The manual process of ensuring paper submissions assigned to reviewers is related to the reviewers' knowledge domain can be very cumbersome and inefficient. Besides, low quality and unfair reviews can result from an inefficient assignment of papers to the invited reviewers.

From extant literature, automated reviewer assignment systems have been built to address this challenge as an information retrieval problem. In a bid to leverage on the recent advancement of artificial neural networks in solving natural language problems in the society, a neural network language model, Word2Vec was used to derive suitability scores based on the semantic relatedness between a submitted paper meant for review and a reviewer's representation. The Integer Linear Programming model used suitability scores to optimise the assignments to ensure the workload on the reviewers is balanced.

To test our model and compare with other Information retrieval models used in solving paper-reviewer assignment problem, a system was implemented in Python programming language. Python libraries such as Natural Language Toolkit was used to perform natural language processing on the experimental datasets and the Gensim Python library were used to implement the models. ORTools, a python library for operation research, was used to develop the Integer Linear Programming exact optimisation used for the assignments. Django framework was used to make the project portable for the web. MySQL was the database management system used in managing the database. Celery was used to make the large tasks run on the background.

From our experiment, we explored whether Word2Vec could be used in paper-reviewer assignments and our results indicate that Word2Vec had approximately the same performance with Latent Semantic Indexing. Evaluation was carried out to test the efficiency of the assignment system on an on-ground truth basis. The results show that Word2Vec provided more accuracy in semantic assignments than Latent Semantic Indexing.