Отчет о проверке

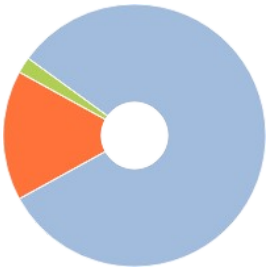
Автор: Пеганов Никита Сергеевич

Название документа: PP4

Проверяющий: ApiCorp

Организация: Национальный Исследовательский Университет "Высшая Школа Экономики"

РЕЗУЛЬТАТЫ ПРОВЕРКИ



Совпадения: 16,05%

Оригинальность: 82,4%

Цитирования: 1,55%

Самоцитирования: 0%

«Совпадения», «Цитирования», «Самоцитирования», «Оригинальность» являются отдельными показателями, отображаются в процентах и в сумме дают 100%, что соответствует полному тексту проверяемого документа.

Есть подозрения на следующие группы маскировки заимствований: Сгенерированный текст на страницах: 1, 2, 3

- **Совпадения** — фрагменты проверяемого текста, полностью или частично сходные с найденными источниками, за исключением фрагментов, которые система отнесла к цитированию или самоцитированию. Показатель «Совпадения» – это доля фрагментов проверяемого текста, отнесенных к совпадениям, в общем объеме текста.
- **Самоцитирования** — фрагменты проверяемого текста, совпадающие или почти совпадающие с фрагментом текста источника, автором или соавтором которого является автор проверяемого документа. Показатель «Самоцитирования» – это доля фрагментов текста, отнесенных к самоцитированию, в общем объеме текста.
- **Цитирования** — фрагменты проверяемого текста, которые не являются авторскими, но которые система отнесла к корректно оформленным. К цитированиям относятся также шаблонные фразы; библиография; фрагменты текста, найденные модулем поиска «СПС Гарант: нормативно-правовая документация». Показатель «Цитирования» – это доля фрагментов проверяемого текста, отнесенных к цитированию, в общем объеме текста.
- **Текстовое пересечение** — фрагмент текста проверяемого документа, совпадающий или почти совпадающий с фрагментом текста источника.
- **Источник** — документ, проиндексированный в системе и содержащийся в модуле поиска, по которому проводится проверка.
- **Оригинальный текст** — фрагменты проверяемого текста, не обнаруженные ни в одном источнике и не отмеченные ни одним из модулей поиска. Показатель «Оригинальность» – это доля фрагментов проверяемого текста, отнесенных к оригинальному тексту, в общем объеме текста.

Обращаем Ваше внимание, что система находит текстовые совпадения проверяемого документа с проиндексированными в системе источниками. При этом система является вспомогательным инструментом, определение корректности и правомерности совпадений или цитирований, а также авторства текстовых фрагментов проверяемого документа остается в компетенции проверяющего.

ИНФОРМАЦИЯ О ДОКУМЕНТЕ

Номер документа: 654907

Тип документа: Прочее

Дата проверки: 29.02.2024 11:37:14

Дата корректировки: Нет

Количество страниц: 3

Символов в тексте: 24432

Слов в тексте: 3679

Число предложений: 207

Комментарий: не указано

ПАРАМЕТРЫ ПРОВЕРКИ

Выполнена проверка с учетом редактирования: Да

Выполнено распознавание текста (OCR): Нет

Выполнена проверка с учетом структуры: Нет

Модули поиска: Библиография, Диссертации НББ, СМИ России и СНГ, Переводные заимствования IEEE, Переводные заимствования по Интернету (EnRu), Коллекция НБУ, Сводная коллекция РГБ, Шаблонные фразы, eLIBRARY.RU, Патенты СССР, РФ, СНГ, Перефразирования по коллекции издательства Wiley, ИПС Адилет, Переводные заимствования*, Кольцо вузов, Цитирование, СПС ГАРАНТ: нормативно-правовая документация, Переводные заимствования (RuEn), СПС ГАРАНТ: аналитика, Перефразирования по СПС ГАРАНТ: аналитика, Перефразирования по Интернету (EN), Переводные заимствования по eLIBRARY.RU (EnRu), Сводная коллекция ЭБС, Переводные заимствования издательства Wiley, IEEE, Перефразированные заимствования по коллекции Интернет в русском сегменте, Издательство Wiley, Переводные заимствования по коллекции Интернет в английском сегменте, Переводные заимствования по коллекции Гарант: аналитика, Перефразирования по Интернету, Перефразирования по eLIBRARY.RU, Переводные заимствования по коллекции Интернет в русском сегменте, Перефразирования по коллекции IEEE, Перефразированные заимствования по коллекции Интернет в английском сегменте, Медицина, Интернет Плюс*

ИСТОЧНИКИ

№	Доля в тексте	Доля в отчете	Источник	Актуален на	Модуль поиска	Комментарий
[01]	4,96%	1,87%	http://fs.unm.edu/neutrosofia-Inv... http://fs.unm.edu	27 Фев 2024	Интернет Плюс*	
[02]	2,91%	1,95%	https://citeseerx.ist.psu.edu/docu... https://citeseerx.ist.psu.edu	17 Фев 2023	Интернет Плюс*	
[03]	2,66%	2,66%	Evolutionary Algorithms for Fuzzy ... https://arxiv.org	25 Мар 2023	Перефразированные заимствования по коллекции Интернет в английском сегменте	
[04]	2,61%	0,83%	Ecology and Society: Using fuzzy c... https://ecologyandsociety.org	19 Окт 2020	Интернет Плюс*	
[05]	2,12%	2,12%	Моделирование бизнес-процесс... http://netess.ru	28 Окт 2019	Переводные заимствования по коллекции Интернет в русском сегменте	
[06]	1,81%	0,38%	A Review of Fuzzy Cognitive Maps ... https://ieeexplore.ieee.org	30 Мая 2012	IEEE	
[07]	1,79%	0,22%	https://pdxscholar.library.pdx.edu... https://pdxscholar.library.pdx.edu	05 Янв 2023	Интернет Плюс*	
[08]	1,67%	0,69%	A Fuzzy Cognitive Map for Identify... https://ieeexplore.ieee.org	13 Дек 2012	Перефразирования по коллекции IEEE	
[09]	1,62%	0,54%	https://scholarsarchive.byu.edu/c... https://scholarsarchive.byu.edu	27 Фев 2024	Интернет Плюс*	
[10]	1,61%	0,43%	Fuzzy Cognitive Maps in Agent Ba... https://ieeexplore.ieee.org	03 Сен 2020	IEEE	
[11]	1,59%	0%	Review study on fuzzy cognitive m... https://ieeexplore.ieee.org	29 Июн 2023	IEEE	
[12]	1,55%	1,55%	не указано	13 Янв 2022	Библиография	
[13]	1,37%	0,7%	https://digitalrepository.unm.edu/... https://digitalrepository.unm.edu	12 Фев 2023	Перефразированные заимствования по коллекции Интернет в английском сегменте	
[14]	1,34%	1,34%	Full Issue https://core.ac.uk	21 Янв 2023	Перефразированные заимствования по коллекции Интернет в английском сегменте	
[15]	1,24%	0%	Ranking Fuzzy Cognitive Map bas... https://doi.org	31 Окт 2016	Издательство Wiley	
[16]	1,22%	0%	Закиева, Елена Шавкатовна Мет... http://dlib.rsl.ru	14 Ноя 2022	Сводная коллекция РГБ	
[17]	1,18%	0%	Fuzzy cognitive maps in systems r... https://link.springer.com	03 Ноя 2022	Интернет Плюс*	
[18]	1,17%	0,24%	Key Elements of Thinking Strategi... http://ijmae.com	28 Фев 2024	Интернет Плюс*	
[19]	1,13%	1,13%	Relevance of the application of th... https://elibrary.ru	31 Дек 2020	eLIBRARY.RU	
[20]	1,12%	0%	Текст (PDF) http://vestnik.vsu.ru	22 Дек 2023	Переводные заимствования по коллекции Интернет в русском сегменте	

[21]	0,96%	0%	не указано	13 Янв 2022	Цитирование	Источник исключен. Причина: Маленький процент пересечения.
[22]	0,96%	0,96%	A New Method for the Design of I... https://ieeexplore.ieee.org	02 Мая 2023	Перефразирования по коллекции IEEE	
[23]	0,93%	0%	A Fuzzy Cognitive Map for Identify... https://ieeexplore.ieee.org	13 Дек 2012	IEEE	Источник исключен. Причина: Маленький процент пересечения.
[24]	0,92%	0%	Fuzzy Cognitive Maps in Agent Ba... https://ieeexplore.ieee.org	03 Сен 2020	Перефразирования по коллекции IEEE	Источник исключен. Причина: Маленький процент пересечения.
[25]	0,92%	0%	https://documentserver.uhasselt.... https://documentserver.uhasselt.be	03 Фев 2023	Перефразированные заимствования по коллекции Интернет в английском сегменте	Источник исключен. Причина: Маленький процент пересечения.
[26]	0,92%	0%	https://pdxscholar.library.pdx.edu... https://pdxscholar.library.pdx.edu	05 Янв 2023	Перефразированные заимствования по коллекции Интернет в английском сегменте	Источник исключен. Причина: Маленький процент пересечения.
[27]	0,9%	0%	A New Method for the Design of I... https://ieeexplore.ieee.org	02 Мая 2023	IEEE	Источник исключен. Причина: Маленький процент пересечения.
[28]	0,79%	0%	https://www.naturalspublishing.c... https://naturalspublishing.com	27 Фев 2024	Интернет Плюс*	Источник исключен. Причина: Маленький процент пересечения.
[29]	0,72%	0%	Cognitive maps analysis of a socia... https://ieeexplore.ieee.org	04 Мая 2015	IEEE	Источник исключен. Причина: Маленький процент пересечения.
[30]	0,71%	0%	Имитационное моделирование ... http://elibrary.ru	15 Фев 2018	eLIBRARY.RU	Источник исключен. Причина: Маленький процент пересечения.
[31]	0,7%	0%	Пояснительная записка Крохина...	11 Апр 2023	Модуль поиска "ВШЭ"	Источник исключен. Причина: Маленький процент пересечения.
[32]	0,68%	0%	shevchenko_e_v_gibkie-proektnye-...	24 Мая 2023	Модуль поиска "ВШЭ"	Источник исключен. Причина: Маленький процент пересечения.
[33]	0,68%	0%	http://fs.unm.edu/NSS/NSS-12-20... http://fs.unm.edu	08 Янв 2023	Перефразированные заимствования по коллекции Интернет в английском сегменте	Источник исключен. Причина: Маленький процент пересечения.
[34]	0,68%	0%	Assessing IT Projects Success with... http://fs.gallup.unm.edu	05 Авг 2021	Перефразированные заимствования по коллекции Интернет в английском сегменте	Источник исключен. Причина: Маленький процент пересечения.
[35]	0,67%	0%	Диссертация на тему «Математи... https://dissercat.com	02 Апр 2022	Интернет Плюс*	Источник исключен. Причина: Маленький процент пересечения.
[36]	0,66%	0%	Визуализация факторов успеха: ... http://elibrary.ru	11 Мая 2018	Переводные заимствования по eLIBRARY.RU (EnRu)	Источник исключен. Причина: Маленький процент пересечения.
[37]	0,65%	0%	Mathematical Modelling of Decisi... https://link.springer.com	15 Ноя 2022	Интернет Плюс*	Источник исключен. Причина: Маленький процент пересечения.
[38]	0,62%	0%	Evaluation of the Sensitivity of Ine... https://ieeexplore.ieee.org	07 Ноя 2023	Перефразирования по коллекции IEEE	Источник исключен. Причина: Маленький процент пересечения.
[39]	0,61%	0%	Remark on the cardinality of the i...	раньше 2011	eLIBRARY.RU	Источник исключен. Причина: Маленький процент пересечения.
[40]	0,5%	0%	Co-occurrence Networks for Word... https://ieeexplore.ieee.org	17 Фев 2023	IEEE	Источник исключен. Причина: Маленький процент пересечения.
[41]	0,47%	0%	Analysis of Complex System Devel...	30 Апр 2022	Модуль поиска "ВШЭ"	Источник исключен. Причина: Маленький процент пересечения.
[42]	0,45%	0%	Type-2 Fuzzy Logic: Challenges an... https://ieeexplore.ieee.org	19 Июл 2012	IEEE	Источник исключен. Причина: Маленький процент пересечения.
[43]	0,43%	0%	Жолдасбекова БАСҚАРУ ПСИХОЛ...	05 Мар 2023	Кольцо вузов	Источник исключен. Причина: Маленький процент пересечения.
[44]	0,43%	0%	On hesitant fuzzy sets and decision https://ieeexplore.ieee.org	02 Окт 2009	IEEE	Источник исключен. Причина: Маленький процент пересечения.
[45]	0,41%	0%	https://www.bsuir.by/m/12_10022... https://bsuir.by	07 Июн 2023	Интернет Плюс*	Источник исключен. Причина: Маленький процент пересечения.
[46]	0,37%	0%	237275 http://biblioclub.ru	19 Апр 2016	Сводная коллекция ЭБС	Источник исключен. Причина: Маленький процент пересечения.
[47]	0,31%	0%	Гринчар, Николай Николаевич К... http://dlib.rsl.ru	27 Дек 2019	Сводная коллекция РГБ	Источник исключен. Причина: Маленький процент пересечения.
[48]	0,31%	0%	Горшкова, Елена Анатольевна ди... http://dlib.rsl.ru	раньше 2011	Сводная коллекция РГБ	Источник исключен. Причина: Маленький процент пересечения.
[49]	0,31%	0%	Авдеева, Зинаида Константинов... http://dlib.rsl.ru	раньше 2011	Сводная коллекция РГБ	Источник исключен. Причина: Маленький процент пересечения.
[50]	0,31%	0%	МЕТОД АНАЛИТИЧЕСКИХ СЕТЕЙ ... http://elibrary.ru	раньше 2011	eLIBRARY.RU	Источник исключен. Причина: Маленький процент пересечения.
[51]	0,31%	0%	КОГНИТИВНЫЙ ПОДХОД К МОД... http://elibrary.ru	01 Янв 2018	eLIBRARY.RU	Источник исключен. Причина: Маленький процент пересечения.
[52]	0,31%	0%	Modeling a balanced scorecard of... http://elibrary.ru	01 Янв 2016	eLIBRARY.RU	Источник исключен. Причина: Маленький процент пересечения.
[53]	0,31%	0%	Fuzzy cognitive mapping: An old t... https://doi.org	31 Дек 2019	Издательство Wiley	Источник исключен. Причина: Маленький процент пересечения.

[54]	0,31%	0%	Методы формирования стратеги... http://tekhnosfera.com	21 Мая 2020	Интернет Плюс*	Источник исключен. Причина: Маленький процент пересечения.
[55]	0,31%	0%	Foresight: a new approach based ... https://eujournalfuturesresearch.springeropen.com	10 Окт 2022	Интернет Плюс*	Источник исключен. Причина: Маленький процент пересечения.
[56]	0,31%	0%	http://proc.ostis.net/proc/Proceed... http://proc.ostis.net	16 Мар 2022	Интернет Плюс*	Источник исключен. Причина: Маленький процент пересечения.
[57]	0,29%	0%	Клинические рекомендации "Ки... http://ivo.garant.ru	27 Сен 2020	СПС ГАРАНТ: нормативно-правовая документация	Источник исключен. Причина: Маленький процент пересечения.
[58]	0,29%	0%	Statistical Analysis of Assigning a ... http://ivo.garant.ru	12 Ноя 2022	СПС ГАРАНТ: аналитика	Источник исключен. Причина: Маленький процент пересечения.
[59]	0,29%	0%	CEO Power and Risk-taking: Inter... http://ivo.garant.ru	12 Ноя 2022	СПС ГАРАНТ: аналитика	Источник исключен. Причина: Маленький процент пересечения.
[60]	0,29%	0%	Applying Complementary Credit S... http://ivo.garant.ru	05 Мар 2022	СПС ГАРАНТ: аналитика	Источник исключен. Причина: Маленький процент пересечения.
[61]	0,29%	0%	Corporate Governance and Risk Di... http://ivo.garant.ru	05 Мар 2022	СПС ГАРАНТ: аналитика	Источник исключен. Причина: Маленький процент пересечения.
[62]	0,29%	0%	https://ecp2019.ru/doc/Book_of_A... https://ecp2019.ru	15 Апр 2022	Интернет Плюс*	Источник исключен. Причина: Маленький процент пересечения.
[63]	0,27%	0%	Novak's gynecology [Текст] http://emll.ru	21 Дек 2016	Медицина	Источник исключен. Причина: Маленький процент пересечения.
[64]	0,25%	0%	Smart Technologies for Society, St... https://dokumen.pub	04 Апр 2022	Интернет Плюс*	Источник исключен. Причина: Маленький процент пересечения.
[65]	0,25%	0%	https://saarj.com/wp-content/uplo... https://saarj.com	29 Ноя 2022	Интернет Плюс*	Источник исключен. Причина: Маленький процент пересечения.
[66]	0,25%	0%	Права, свободы, законные интер... http://elibrary.ru	14 Сен 2015	eLIBRARY.RU	Источник исключен. Причина: Маленький процент пересечения.
[67]	0,25%	0%	Dynamical cognitive network-an e... https://ieeexplore.ieee.org	06 Авг 2002	IEEE	Источник исключен. Причина: Маленький процент пересечения.
[68]	0,25%	0%	A Fuzzy Cognitive Maps Tool for D... https://doi.org	31 Мар 2016	Издательство Wiley	Источник исключен. Причина: Маленький процент пересечения.
[69]	0,25%	0%	New Product Development Strate... https://journals.sagepub.com	24 Мар 2021	Интернет Плюс*	Источник исключен. Причина: Маленький процент пересечения.
[70]	0,25%	0%	https://bijournal.hse.ru/data/2015... https://bijournal.hse.ru	11 Апр 2020	Интернет Плюс*	Источник исключен. Причина: Маленький процент пересечения.
[71]	0,23%	0%	Oncology http://emll.ru	21 Дек 2016	Медицина	Источник исключен. Причина: Маленький процент пересечения.
[72]	0,23%	0%	Fuzzy cognitive map - Wikipedia https://en.wikipedia.org	27 Фев 2024	Интернет Плюс*	Источник исключен. Причина: Маленький процент пересечения.
[73]	0,23%	0%	Systems Thinking to Improve the ... https://ncbi.nlm.nih.gov	28 Фев 2024	Интернет Плюс*	Источник исключен. Причина: Маленький процент пересечения.
[74]	0,22%	0%	dissertation (merge) — Toimetova	27 Мая 2023	Кольцо вузов	Источник исключен. Причина: Маленький процент пересечения.
[75]	0,2%	0%	Correlation coefficient for type-2 f... https://doi.org	27 Дек 2005	Издательство Wiley	Источник исключен. Причина: Маленький процент пересечения.
[76]	0,19%	0%	139354 http://e.lanbook.com	раньше 2011	Сводная коллекция ЭБС	Источник исключен. Причина: Маленький процент пересечения.
[77]	0,19%	0%	https://www.irbnet.de/daten/icon... https://irbnet.de	02 Мар 2023	Интернет Плюс*	Источник исключен. Причина: Маленький процент пересечения.
[78]	0,18%	0%	Межгосударственный стандарт Г... http://ivo.garant.ru	13 Сен 2021	СПС ГАРАНТ: нормативно-правовая документация	Источник исключен. Причина: Маленький процент пересечения.
[79]	0,16%	0%	Intelligent and Fuzzy Techniques: ... https://dokumen.pub	27 Фев 2024	Интернет Плюс*	Источник исключен. Причина: Маленький процент пересечения.

A Program for Modeling the Perception of Success Factors of an IT-Project Using Fuzzy Cognitive Maps

Peganov Nikita
Faculty of Computer Science
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Abstract — This study introduces a new program that uses Fuzzy Cognitive Maps (FCMs) to model the perception of success factors in Information Technology projects. The study aims to provide a comprehensive understanding of the complex relationships and interdependencies among various factors that contribute to the success of IT projects. The proposed program employs FCMs, a cognitive modeling technique that captures the inherent fuzziness and uncertainty in human reasoning and decision-making processes. The program's effectiveness was evaluated through a series of case studies involving real-world IT projects. The results demonstrate the program's potential in accurately modeling and analysis of the success of IT projects, thereby aiding project managers in strategic planning and decision-making.

Keywords — Cognitive maps, Fuzzy cognitive maps, IT-project, Success Factors, Risk Management, Success Perception, Project Management, Fuzzy Logic, Decision Making, Fuzzy Set Theory.

I. INTRODUCTION

The area of the research is the application of fuzzy cognitive maps in modeling and understanding the success factors of IT projects. This involves the development of a program that uses fuzzy computing models to visualize and analyze these factors and their interrelationships. The research also explores the use of this program in various fields such as IT project management, research in the field of IT, education and combination with other methods.

The problem solving in this work is predicting IT project success due to various interconnected factors. This is crucial as successful IT implementation is vital in today's tech-dependent world. The proposed program will aid in decision-making and project management by visualizing these complex relationships.

In this work, a software program is developed. It uses fuzzy cognitive maps to model and analyze the perception of success factors in IT projects. The program will allow users to visualize and understand the complex relationships between these factors, adjust the model over time and identify new dependencies. The program also helps identify the most significant factors and the connections between them.

The methodology of cognitive modeling was proposed by the American political scientist and economist Robert Axelrod [1]. Cognitive modeling was designed to make decisions in poorly defined situations. Fuzzy cognitive maps, first proposed by Bart Kosko [2], are a mixed type of graphical representation of knowledge that includes elements of cognitive maps and fuzzy logic.

This method uniquely uses fuzzy cognitive maps to analyze IT project success factors, considering their ambiguity and interconnections. It enables visualization of complex systems over time and adapts to changes in factors. It also aids collective decision-making in unclear situations, making it a useful tool for IT stakeholders.

The developed program aims to accurate visualize and analyze IT project success factors, considering their complex interrelationships. It allows for model adjustments, uncovering new dependencies and vulnerabilities. It's a useful tool for IT professionals, educators, students, and researchers, aiming to enhance decision-making and project success rates in the IT sector.

This paper is divided into five sections: introduction, literature review, methodology, results, and conclusion. It discusses the developed program, its purpose, target audience, and applications. It reviews cognitive modeling and the use of fuzzy cognitive maps in research. The methodology used in the program includes fuzzy sets and their application. The results show the results of the study, such as the usability of the created program for users. The conclusion summarizes the findings and discusses the program's potential impact in the IT sector.

II. LITERATURE REVIEW

The application of fuzzy cognitive maps (FCMs) in modeling the success factors of IT projects is a significant area of interest. This approach is particularly relevant in the context of complex and rapidly evolving sectors such as mobile telecommunications.

In the study "Modeling IT projects success with Fuzzy Cognitive Maps" [7], the authors successfully apply FCMs to model the success factors of a mobile payment system project. The proposed methodology involves the utilization of four matrices: the Initial Success Matrix (IMS), the Fuzzified Success Matrix (FZMS), the Relationship Strength Success Matrix (SRMS), and the Final Success Matrix (FMS). These matrices represent the results at each stage of the methodology.

This study advances our understanding of the application of FCMs in IT project success modeling. The writers emphasize the significance of Critical Success Factors (CSFs) as the essential prerequisites for a project to be deemed successful. They contend that due to the escalating complexity and unpredictability in the IT sector, there is a need for enhanced procedures to identify and assess appropriate CSFs for IT projects. This work, therefore, provides a valuable framework for assessing project success in the context of IT projects.

Cognitive maps are a powerful tool for modeling project success, as they can present complex ideas and information in a simple and understandable form. They are particularly useful in improving the understanding and organization of knowledge, which can lead to more effective decision-making.

In the study "Using cognitive maps for modeling project success" [8], cognitive maps were applied to a real construction project in Turkey. The authors highlighted the benefits of cognitive maps, emphasizing their ability to simplify complex information and enhance knowledge organization. This, in turn, facilitates better decision-making processes.

Despite the noted advantages, the study also acknowledges the potential challenges of using cognitive maps, such as their complexity and subjectivity. This balanced perspective provides a more comprehensive understanding of cognitive maps, advancing our knowledge of their application in project success modeling. The study's application of cognitive maps to a real-world project further demonstrates their practical utility, offering valuable insights for future project management practices.

The success of IT projects, such as a mobile payment system project, can be assessed using various cognitive mapping techniques.

In a study conducted by the authors of the article "Assessing IT-projects success with extended fuzzy cognitive maps & neutrosophic cognitive maps in comparison to fuzzy cognitive maps" [9], they evaluated the success of an IT project by comparing the efficiency of extended fuzzy cognitive maps and neutrosophic cognitive maps. The authors created various cognitive maps with several groups of stakeholders to carry out this comparison.

The findings of this study represent a significant advancement in the field of IT project success assessment. The authors concluded that neutrosophic cognitive maps outperformed fuzzy cognitive maps and improved cognitive maps in assessing the success of the project. This suggests that neutrosophic cognitive maps could potentially be a more effective tool for evaluating the success of IT projects.

An analysis of the literature shows that the use of cognitive maps is an effective tool for modeling and evaluating the success factors of IT projects. These methods allow you to present complex ideas and information in a simple and understandable form, improve the understanding and organization of knowledge, and contribute to more effective decision-making.

However, as noted in the analyzed papers, these methods have their drawbacks, including the complexity of creating and interpreting maps, especially with a large amount of information and complex relationships, as well as subjectivity, since they are based on the knowledge and perception of an individual or a group of people.

It is also important to highlight that all the reviewed papers underscore the significance of identifying and evaluating critical success factors (CSF) for IT projects. This validates the pertinence of our research and the selected subject for the final qualifying work.

Therefore, the creation and application of a program that uses fuzzy cognitive maps to model the perception of success factors in IT projects is a valuable and pertinent method for addressing the intricate issue of IT-management and planning.

III. METHODOLOGY

In this study, a software program was developed. It uses fuzzy cognitive maps to model and understand the perception of success factors in IT projects. The hypotheses tested include the effectiveness of fuzzy cognitive maps in visualizing and analyzing the complex relationships between success factors, the adaptability of the model over time, and its ability to identify new dependencies and vulnerabilities. It is also hypothesized that this program can be a useful tool for IT professionals, educators, students, and researchers, enhancing decision-making and project success rates in the IT sector.

The experiment was designed to develop a software program that uses fuzzy cognitive maps to model and analyze the perception of success factors in IT projects. The assumptions made were that the success of IT projects is dependent on various interconnected factors and that these relationships can be accurately represented and analyzed using fuzzy cognitive maps. It was also assumed that the program would be able to adapt to changes in these factors over time, and that it would be a useful tool for decision-making in IT project management.

Accurate and specific evaluation parameters are needed to assess the success of an IT project. In the context of this project, the main evaluation parameters were:

- **Number of users**: This parameter reflects the total number of users using this program. An increase in this number indicates the success of the program in the market.
- **User Ratings**: Ratings and feedback from users can provide valuable information about how well the program responds to user needs, and what improvements it requires.
- **Number of mentions in research papers**: The more a program is mentioned in academic or industrial research, the greater its impact on the field of science and technology, which is a sign of its success.
- **Popularity on the Internet**: This parameter can be measured through various indicators, such as the number of search queries, mentions on social networks, etc. An increase in this indicator indicates that the program is attracting more and more interest.

These parameters are a cumulative indicator of the success of this project and will be used to evaluate and analyze the effectiveness of the product throughout its life cycle.

Additionally, the parameters for evaluating the success of a project are parameters that can only be clarified by collecting metrics and receiving feedback from users:

- **Modeling accuracy:** The final product should provide accurate modeling of the perception of IT projects, while providing the ability to easily include or exclude various parameters.
- **Efficiency of use:** Using the program should not require significant time or resources to dive into the details of using the program.
- **Adaptability to change:** The program must be able to adapt to changes in environmental conditions or parameters.
- **User-friendliness of the interface:** The program interface should be intuitive for users, providing easy access to basic functions and settings.
- **The ability to scale:** The program should provide the ability to scale to work with larger or more complex projects in the future.

When designing and developing software for modeling the perception of success factors of an IT project using fuzzy cognitive maps, the following key technical and software tools were selected:

- Django. Django is a powerful and flexible Python web framework that allows you to quickly create complex web applications. It provides a high level of security and supports data model-based development, which significantly speeds up the application creation process. Django also contains sophisticated tools for form processing and user authentication.
- JavaScript. This programming language is used to create the client side of a web application. It provides an interactive and dynamic user interface, allows you to process user input, manage page elements and interact with the server.
- Additional funds. To work with databases, a Postgres relational database can be selected, which provides sufficient functionality for storing and processing data in this project.

All the selected technologies are open and widely used in practice, which provides good information support and opportunities for further development of the project.

The program for modeling the perception the success factors of an IT project is based the use of fuzzy sets.

Types of fuzzy sets:

1. Fuzzy sets (of the first type) are a key element in the field of fuzzy logic, which was first proposed by Lotfi Zadeh in 1965 [10]. Unlike classical binary logic, where an element either belongs to a set or not, fuzzy sets allow elements to belong to a set to a certain extent. This is achieved by introducing the membership function, which assigns to each element a number from 0 to 1, reflecting the degree of its membership in the set. This approach allows for more accurate modeling of the uncertainty and fuzziness of the real world, which makes fuzzy sets useful in many fields, including artificial intelligence, decision-making systems, image processing, and many others.

   A fuzzy set $\tilde{A}$ is understood as a set of ordered pairs composed of elements x of the universal set X and the corresponding degrees of membership $\mu_A(x)$:

   $$\tilde{A} = \{(x, \mu_A(x)) | x \in X\}$$

   where $\mu_A(x)$ is the membership function indicating to what extent the element x belongs to the fuzzy set A. The function $\mu_A(x)$ takes values in some linearly ordered set M, which is called the accessory set.

2. Fuzzy sets of the second type are an extension of the classical theory of fuzzy sets proposed by Lotfi Zadeh in 1975. They were introduced to simulate situations where the degree of belonging of an element a set is itself fuzzy. Unlike ordinary fuzzy sets, where each element is assigned a degree of belonging in the range from 0 to 1, in fuzzy sets of the second type, a fuzzy set of the first type is assigned to each element. Therefore, second type fuzzy sets accommodate a high level of uncertainty and ambiguity, making them beneficial in various applications such as decision-making systems, fuzzy information processing, and complex system modeling. Formally, second type fuzzy sets can be defined as:

   $$\tilde{A} = \int_{x \in X} \int_{u \in J_x} \mu_{\tilde{A}}(x, u)/(x, u)$$

   where the sign of double integration means the union of valid x and u for a continuous universal set (for discrete universal sets, double summation symbols are used instead).

3. Fuzzy Sets of Type 3 is an improved version of Type 2 sets, designed with advanced capabilities for uncertainty management. In type 3 sets, the secondary membership function is also a type 2 membership function. This means that the upper and lower limits of membership are not fixed, unlike type 2 sets. This characteristic allows fuzzy type 3 sets to cope with a higher degree of uncertainty [11]. A fuzzy set of type 3 can be defined as follows:

   For each element $x \in X$, the membership function $\mu_A(x)$ a fuzzy set $\tilde{A}$ of type 3 is defined as:

   $$\mu_A(x) : X \to [0, 1] \times [0, 1]$$

   where the first element of the pair represents the lower limit of membership, and the second element represents the upper limit of membership.
   Secondary membership function $\mu_A^{'}(x)$ is defined as:

   $$\mu_A^{'}(x) : [0, 1] \to [0, 1]$$

   where $\mu_A^{'}(x)$ represents the degree of confidence that x belongs to the set A.

4. An intuitionistic fuzzy set is a generalization of a fuzzy set that includes the degree of non belonging of a function in addition to the membership function. It was introduced by Atanasov as a way to deal more comprehensively with uncertainty and inaccuracies. An intuitionistic fuzzy set can be defined as:

   Let X be a nonempty set. The intuitionistic fuzzy set (IFS) $\tilde{A}$ in X is defined as $\tilde{A} = \{(x, \mu_A(x), \nu_A(x)) | x \in X\}$, where $\mu_A(x) : X \to [0, 1]$ and $\nu_A(x) : X \to [0, 1]$ are functions representing the degree of belonging and non-participation of each element x in X to the set A, respectively, satisfying the condition $0 \leq \mu_A(x) + \nu_A(x) \leq 1$ for each $x \in X$.

   In this definition, $\mu_A(x)$ is an affiliation function, and $\nu_A(x)$ is a non-affiliation function. Condition $0 \leq \mu_A(x) + \nu_A(x) \leq 1$ guarantees that the sum of the degrees of membership and non-membership for any element does not exceed 1, which is a fundamental property of intuitionistic fuzzy sets.

In this final qualifying work, sets of type 1 and type 2, as well as intuitionistic fuzzy sets, was considered. Fuzzy sets of type 3 are not intuitive enough, and also complicate data entry on the part of the program user.

The project posed numerous obstacles. To begin with, the intricacy of IT projects and the abundance of success factors complicated the process of precisely modeling and examining these elements and their connections. Secondly, the ambiguity and uncertainty inherent in these factors posed a challenge in applying fuzzy cognitive maps. Thirdly, the development of a user-friendly software program that can effectively visualize these complex relationships and adapt to changes over time was a significant task. Lastly, validating the effectiveness of the program in enhancing decision-making and improving IT project success rates required rigorous testing and evaluation.

IV. RESULTS

The results of this research were promising, demonstrating the potential of the developed program in modeling and understanding the success factors of IT projects. The program was able to accurately visualize and analyze the complex interrelationships between these factors, allowing for model adjustments and uncovering new dependencies and vulnerabilities.

The fuzzy cognitive maps generated by the program were able to represent the ambiguity and interconnectedness of IT project success factors. The maps provided a clear visual representation of these factors and their relationships, making it easier for users to understand and analyze them. The program was also able to adapt to changes in factors over time, demonstrating its flexibility and adaptability.

In terms of decision-making, the program proved to be a useful tool. It enabled collective decision-making in unclear situations, aiding IT stakeholders in making informed decisions about their projects. The program was also able to identify potential vulnerabilities in IT projects, allowing stakeholders to address these issues proactively.

Furthermore, the program was well-received by its target audience, which included IT professionals, educators, students, and researchers. Users found the program to be user-friendly and intuitive, and they appreciated its ability to visualize complex systems and relationships.

In conclusion, the results of this research indicate that the developed program, which uses fuzzy cognitive maps to model and analyze IT project success factors, is a valuable tool for the IT sector. It not only aids in decision-making and project management but also enhances understanding of the complex factors that contribute to the success of IT-projects.

V. CONCLUSION

In conclusion, this research has successfully developed a software implementation that utilizes fuzzy cognitive maps to model and analyze the success factors of IT projects. The program provides a dynamic and adaptable map that visualizes the complex interrelationships between these factors. This map serves as a valuable tool for stakeholders, allowing them to interpret the knowledge gained and make informed decisions.

The model, presented in the form of a cognitive map, effectively highlights the value judgments that emerged during the discussion. This feature is particularly beneficial as it provides a clear representation of the factors deemed most significant by the stakeholders.

Furthermore, the program's functionality extends to identifying specific nodes and connections that are flagged by stakeholders for further discussion. This feature ensures that all relevant factors are thoroughly examined and considered, thereby enhancing the decision-making process.

The paper could benefit from a more detailed discussion on the potential implications and applications of the developed program in real-world scenarios. This could include specific examples of how IT project managers, data analysts, and other professionals could use the program to enhance their decision-making processes and improve project outcomes. Additionally, the research work could also delve into potential limitations of the program and areas for future research. This would provide a more comprehensive and balanced view of the program's capabilities and potential for growth. Lastly, a reflection on the research process and the lessons learned could also add depth to the paper.

Overall, the software implementation developed in this research offers a unique and effective approach to understanding and predicting IT project success. It holds significant potential for improving project management and decision-making in the IT sector, and it is anticipated that its use will lead to increased project success rates. Future work could explore the application of this program in other sectors and its integration with other decision-making tools.

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