Vilnius University

Off-Chain Scaling Solutions for Proof-of-work Based Blockchain

Mir Hassan
Supervisor: Prof, Dr. Remigijus Paulavicius
Semester 1

Plan of studies & implementation Summary

Study year	Exams		Conference participations		Publications	
	Planned	Completed	Planned	Completed	Planned	Completed
I (2021/2022)	2	1				
II (2022/2023)	2	0	1	0	1	0
III (2023/2024)			1	0	1	0
IV (2024/2025)			1	0	1	0

Vilnius University

Report of activity plan

Exams		Conference Participation		Publications	
Planned	**Status**	**Planned**	**Status**	**Planned**	**Status**
Machine Learning	Failed: Try to Pass till June				
Research methods and methodology of informatics and computer engineering	In Progress				

Workshops participated in

Workshop	ECTS
MOKSLINIŲ REZULTATŲ PUBLIKAVIMAS PAGAL FORMALAUS VERTINIMO REIKALAVIMUS	0.1
MOKSLINĖS INFORMACIJOS IŠTEKLIAI, PAIEŠKA, IR ĮRANKIAI	0.1
MENDELEY PRAKTINIS UŽSIĖMIMAS	0.15
Total:	0.35/3

Stages of research and dissertation preparation

	Name of task	Duration	Notes
1.	Review and analysis of scientific research on the topic of the dissertation (in Lithuania and abroad): 1.1. Perform an analytical review of the most popular Proof-of-Work (PoW) blockchain networks; 1.2. Identify scientific challenges related to PoW blockchain scalability solutions using off-chain technologies.	September 2021 – August 2022	Perform literature review on Blockchain-based Proof-of-work in Healthcare, which is currently ongoing as planned.
2.	Prosecution of Scientific Research: **2.1. Formation of study methodology :** 2.1.1. Selection of a research methodology to address the task at hand; 2.1.2. Designing theoretical and empirical research based on the chosen methodology.	September 2022 – January 2023	
	2.2. Theoretical research: 1. Identification of areas for extension of blockchains using off-chain technologies; 2. Investigating the extension of blockchains using off-chain technologies; 3. Developing a testing model for the extension of blockchains using off-chain technologies.	February 2023 – September 2022	

Research Object and Aim

Research object:
- Off chain scaling Solutions.
- Application of Blockchain-based and Machine Learning based methods for Healthcare System.

Research aim:

- To develop, implement and research Blockchain-based and deep neural networks application in Healthcare.

Objectives of Research

1. To **develop and investigate** Blockchain and deep learning based methods in Healthcare (e.g. Electronic Health Record management)

2. To **compose and implement** a new Blockchain-based system along with deep learning and the Internet of Medical things in healthcare.

What has been carried out so far

- Literature study from research papers on Blockchain, machine learning and Internet of Things in healthcare

- Taking courses on Machine learning (at VU) and Development of Blockchain Industry Applications (Online).

- Trying out some state of art deep learning models on healthcare datasets (VGG16 and Resenet50)

Work plan for rest of the year

Review and analysis of scientific research on the topic of the dissertation :

- Defining and describing the objectives of the dissertation research topic.

- Overview of Blockchain-based Off-chain scaling solutions.

- Summary of methods overview and presentation on the description of the analytical part of the dissertation.

- Formation of research goal.

Passing exam:

- Machine learning

- Research methods and methodology of informatics and computer engineering

Vilnius University

Thank you