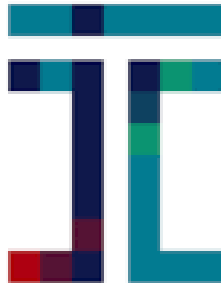


CYPRUS UNIVERSITY OF TECHNOLOGY
FACULTY OF ENGINEERING AND TECHNOLOGY



Master's Thesis

Crawling Gun black markets using Ache

Demetres Papadopoulos

Limassol, May 2023

CYPRUS UNIVERSITY OF TECHNOLOGY
FACULTY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF ELECTRICAL ENGINEERING
COMPUTER ENGINEERING AND INFORMATICS

Crawling Gun black markets using Ache

Demetres Papadopoulos

Limassol, May 2023

Approval Form

CYPRUS UNIVERSITY OF TECHNOLOGY

**Analyse the impact of black markets upon war outbreak
using ACHE**

PRESENTED BY

DEMETRES PAPADOPOULOS

Advisor _____

Dr. Michael Sirivianos

Committee member _____

Dr. Fragkiskos Papadopoulos

Committee member _____

Dr. Herodotos Herodotou

CYPRUS UNIVERSITY OF TECHNOLOGY

LIMASSOL, MAY 2023

Copyrights

Copyright© 2023 Demetres Papadopoulos

All rights reserved.

The approval of the thesis by the Department of Electrical Engineering, Computer Engineering and Information does not necessarily imply the approval by the Department of the views of the writer

Acknowledgments

I would like to express my heartfelt gratitude to the individuals who have played a significant role in the successful completion of this dissertation.

First and foremost, I extend my deepest appreciation to my supervisor, Dr. Michael Siriviano. Their unwavering support, guidance, and expertise have been invaluable throughout this research journey. Their insightful feedback, constructive criticism, and encouragement have immensely contributed to the development and refinement of this work. I am truly grateful for their mentorship and the opportunity to learn from their wealth of knowledge in the field.

I would also like to acknowledge the invaluable contributions of Dr. Niko Salamano and Dr. Pantelitsa Leonidou. Their expertise, academic rigor, and valuable insights have greatly enriched the scope and quality of this dissertation. Their willingness to engage in thought-provoking discussions and provide guidance at crucial stages of the research process have been instrumental in shaping my ideas and enhancing the overall scholarly contribution of this work.

Abstract

The internet has profoundly transformed communication, access to information, and business operations. It enables easy connectivity and provides vast information resources. The internet has also revolutionized shopping, entertainment, and the way businesses operate. It has significantly impacted our daily lives, changing how we live and work. The dark web, also known as the hidden web, refers to unindexed parts of the internet accessible through special software like Tor. It is associated with illegal activities but also used for legitimate purposes like anonymous communication and sharing sensitive information. Accessing the dark web carries risks, and caution is necessary to protect anonymity. Crawling the dark web involves using specialized tools to gather information for various purposes, but it presents challenges such as anonymity, encountering illegal content, and difficulty in accessing websites. Dark web crawling requires expertise and careful consideration of risks and ethics.

The dark web hosts black markets that facilitate the sale of illegal goods and services. These markets operate to evade law enforcement and protect buyer-seller anonymity. Common items sold on dark web black markets include drugs, weapons, stolen credit card numbers, and personal information. Purchasing from these markets is illegal and risky due to uncertain product quality and safety.

Regarding weapon trafficking, the impact on the dark web is challenging to ascertain due to its unregulated and anonymous nature. Conflicts or wars may increase the demand for weapons, potentially leading to more weapon sales on the dark web. However, engaging in such activities is illegal and carries severe legal consequences. Purchasing weapons from the dark web also entails risks like counterfeit or faulty products and fraudulent sellers. By combining the mentioned technologies, a comprehensive understanding of the internet's impact can be extracted.

Table of Contents

1	Introduction	7
1.1	Problem Statement&Motivation	7
1.2	Challenges	9
1.3	Contribution	10
2	Background Theory and Related Work	11
2.1	Introduction to Dark Web	11
2.1.1	TOR	13
2.2	Dark Web Crawling	14
2.2.1	Existing Crawlers	15
3	Methodology and Tools	19
3.1	ACHE Crawler	19
3.2	ACHE Architecture	19
3.3	Elasticsearch	20
3.4	TOR Proxy	21
3.5	Combination of all three	21
4	Implementation	22
4.1	Ache Instalation	22
4.2	Ache Configuration	22
5	Results	24
5.1	Data Collection	26
5.1.1	Structural information and contribution of black markets	26
5.1.2	Sources of Results	26
5.1.3	Pre - Processing	27
6	Analysis	31
6.1	Weapon market Price	31
6.2	Payment methods	33
6.3	shipping method	34
7	Future work	35
8	Conclusion	36
9	References	37

List of Figures

- 1 Average prices per crawl and product for light weapons 31
- 2 Average prices per crawl and product for heavy weapons 32

List of Tables

1	Comparison of Characteristics for Dark Web Crawlers	18
2	Black markets crawls - Marketplaces	24
3	Dates of the crawl	25
4	Payment and Shipping Methods on the Dark Web	25
5	Payment on the Dark Web	25
6	Shipping Methods on the Dark Web	25
7	Dark Web Weapons Prices	29
8	Dark Web ammunition Prices	30