

**Příjemci podpory:**

Vysoké učení technické v Brně  
Fakulta informačních technologií

**Poskytovatel:**

Ministerstvo vnitra ČR

**BAZAR: Budování komunity k problematice bezpečnostních temných tržišť**

Identifikační kód VJ01030004

**Název předkládaného výsledku:**

**Software pro korelaci obchodů na tržišťích s  
transakcemi v blockchain databázích**

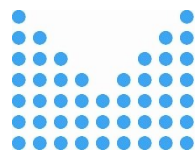
Typ výsledku dle UV č. 837/2017	Evidenční číslo (příjemce)	Rok vzniku
R2 software	R2	2021
ISBN-ISSN	Webový odkaz na výsledek	Kde a kdy publikováno
	<a href="https://www.fit.vut.cz/research/product/708/">https://www.fit.vut.cz/research/product/708/</a>	web

**Stručná anotace k výsledku:**

Software jako vstupy používá výstupy software pro sběr metadat. Porovnáním změn údajů o inzerovaných produktech v čase (jako čítadlo nákupů, stav skladových zásob a cena) tento software detekuje proběhlý obchod (tj. nákup komodity na tržišti) a v relevantním časovém okně a vyhledává kryptoměnové transakce, jejichž hodnota je nejbližší kalkulované výši obchodu. Takto objevené adresy v dané kryptoměně pak označí příznakem identifikujícím je jakožto potenciální zákazníky či prodejce daného tržiště.

**Řešitelský tým:**

Daniel Dolejška, Vladimír Veselý (manažer a hlavní řešitel), Matěj Grégr



***Příjemci podpory:***

***Poskytovatel:***

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## Úvod

Tento program využívá informace získané programem projektu TorScraper ke korelaci a vyhledávání transakcí v blockchainech kryptoměn podporovaných službou Blockbook.

## Instalace

Tento nástroj v celém rozsahu využívá prostředí vytvořené pro projekt TorScraper (software pro sběr dat a metadat z darknet tržišť). Pro sestavení odpovídajícího prostředí se prosím odkazujte na odpovídající dokumentaci projektu TorScraper.

Zdrojové soubory analyzátoru musí být součástí kontejneru/prostředí projektu TorScraper. To lze provést například provázáním lokálních složek v souboru `docker-compose.yml`:

```
services:
  scraper:
    container_name: torscraper_app
    ...
    volumes:
      ...
      # include analyzer sources
      - /path/to/analyzer/sources:/analyzer
```

Nastavení služeb (připojení k databázi apod.) jsou převzaty z prostředí projektu TorScraper. Aplikace pro svou správnou funkcionalitu potřebuje nasazení instance programu Blockbook, který umožňuje parametrizovatelné procházení blockchainu odpovídajících kryptoměn. Nasazení tohoto programu není součástí tohoto projektu, je možné využít oficiální veřejné instance.

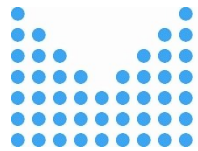
## Spuštění aplikace

Spuštění aplikace je nejsnazší v kontejneru a probíhá následovně (“přepínače” jsou nahrazeny přepínači konzolového rozhraní aplikace ze sekce uživatelského manuálu):

```
docker exec -it torscraper_app python /analyzer/analyzer.py (přepínače)
```



VYSOKÉ UČENÍ FAKULTA  
TECHNICKÉ INFORMAČNÍCH  
V BRNĚ TECHNOLOGIÍ



MINISTERSTVO VNITRA  
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Příjemci podpory:

Poskytovatel:

```
xdolet08@bazar: japtforscraper
Default: xdolet08@bazar: japtforscraper (ssh) - /dev/tty002
[~/Analyzer/, /usr/local/lib/python3.9.zip, /usr/local/lib/python3.9, /usr/local/lib/python3.9/lib-dynload, /usr/local/lib/python3.9/site-packages, /app, /plugins/darkmarket/]
[scraper.config.base] (MainProcess): loading configuration from '/app/config/app.yaml'
[scraper.config.base] (MainProcess): validating loaded configuration
[scraper.mixins] (MainProcess): adding {'plugins/darkmarket'} to PYTHONPATH
[asyncio] (MainProcess): Using selector: EpollSelector
[analyzer.utils.args] (MainProcess): loaded program args: ProgramArgs(blockbook_api={'BTC', 'http://147.229.14.212:3001/api/v2'}, time_from_datetime.datetime(2021, 8, 12, 0, 0), time_to_datetime.datetime(2021, 8, 14, 0, 0), vendor_name='NextGeneration', product_name=None)
[scraper.database.connector] (MainProcess): loading available database plugins
[scraper.database.connector] (MainProcess): initializing database plugin classes: <class 'plugin.default.database.http_response_archive.HTTPResponseArchive', <class 'plugin.default.database.http_response_archive.HTTPResponseHeader', <class 'plugin.default.database.services.Services', <class 'plugin.default.database.services.ServiceCode', <class 'plugin.anticaptcha.database.antiCaptcha', <class 'plugin.darkmarket_basics.database.images.Image', <class 'plugin.darkmarket_basics.database.images.ProductImage', <class 'plugin.darkmarket_basics.database.images.VendorImage', <class 'plugin.darkmarket_basics.database.images.ProductMeta', <class 'plugin.darkmarket_basics.database.products.Product', <class 'plugin.darkmarket_basics.database.products.ProductCategory', <class 'plugin.darkmarket_basics.database.products.ProductMeta', <class 'plugin.darkmarket_basics.database.products.ProductVariantPrice', <class 'plugin.darkmarket_basics.database.vendors.Vendor', <class 'plugin.darkmarket_basics.database.vendors.VendorKey', <class 'plugin.twocaptcha.database.twocaptcha.Captcha'
[main] (MainProcess): Initializing Redis connection pool, config={'address': 'redis://redis:6379@encoding=utf-8', 'db': 2}
[alorandis] (MainProcess): Creating tcp connection to ('redis', 6379)
[analyzer.blockbook.client] (MainProcess): Initializing with 1 blockbook APIs: {'BTC': 'http://147.229.14.212:3001/api/v2'}
[scraper.utils.mixins.http_client.mixin] (MainProcess): (BlockbookClient) created new simple HTTP client session <scraper.utils.mixins.http_client.mixin.LoggingClientSession object at 0x7f76828520b, options={}
[main] (MainProcess): Initializing transaction analyzer module
[analyzer.transaction_correlator] (MainProcess): creating database session
[scraper.database.connector] (MainProcess): creating new session for primary database
[main] (MainProcess): loading current BTC blockchain information
[analyzer.transaction_correlator] (MainProcess): loading blockchain info for BTC
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2
[analyzer.utils.redis.cache] (MainProcess): caching result of <function BlockbookClient.status at 0x7f7690ff6bc to Redis at method_call(0x590e485584c6
[analyzer.transaction_correlator] (MainProcess): stored local blockchain info for BTC: {'height': 718322, 'time': datetime.datetime(2021, 1, 12, 16, 14, 9, 372199, tzinfo=tzutc())}
[main] (MainProcess): starting purchase analysis
[analyzer.transaction_correlator] (MainProcess): finding transaction matches for ProductStats(product_id='d6b38902-8688-5116-8572-6593c3e74fd2', created_at='2021-08-12 02:33:39.694330+02:00', sales='517', sales_delta='1', ...)
[analyzer.transaction_correlator] (MainProcess): fetched previous stat entry: ProductStats(product_id='d6b38902-8688-5116-8572-6593c3e74fd2', created_at='2021-08-12 02:13:14.518186+02:00', sales='516', sales_delta='0', ...)
[analyzer.transaction_correlator] (MainProcess): fetched next stat entry: None
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/696166
[analyzer.utils.redis.cache] (MainProcess): caching result of <function BlockbookClient.get_block at 0x7f7690ff700b to Redis at method_call(0x21270a3c3623838
[analyzer.transaction_correlator] (MainProcess): initial lower boundary block ('2021-08-12T02:18:37+02:00', '2021-08-11T21:33:39.694330+02:00')
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695394
[analyzer.utils.redis.cache] (MainProcess): caching result of <function BlockbookClient.get_block at 0x7f7690ff700b to Redis at method_call(0x52667073766ff6
[analyzer.transaction_correlator] (MainProcess): found better lower boundary block ('2021-08-12T02:36:20+02:00', '2021-08-11T21:33:39.694330+02:00')
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695310
[analyzer.utils.redis.cache] (MainProcess): caching result of <function BlockbookClient.get_block at 0x7f7690ff700b to Redis at method_call(0x186e4f7076990777
[analyzer.transaction_correlator] (MainProcess): found better lower boundary block ('2021-08-11T20:11:52+02:00', '2021-08-11T21:33:39.694330+02:00')
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695343
[analyzer.utils.redis.cache] (MainProcess): caching result of <function BlockbookClient.get_block at 0x7f7690ff700b to Redis at method_call(0x257e2db260161e
[analyzer.transaction_correlator] (MainProcess): initial lower boundary block ('2021-08-12T01:33:30+02:00', '2021-08-12T02:33:39.694330+02:00')
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695344
[analyzer.utils.redis.cache] (MainProcess): caching result of <function BlockbookClient.get_block at 0x7f7690ff700b to Redis at method_call(0x7f51634772d9239
[analyzer.transaction_correlator] (MainProcess): found better upper boundary block ('2021-08-12T01:52:19+02:00', '2021-08-12T02:33:39.694330+02:00')
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695310?page=1
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695311?page=1
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695312?page=1
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695313?page=1
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695314?page=1
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695315?page=1
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695316?page=1
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695317?page=1
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695318?page=1
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695319?page=1
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695320?page=1
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695321?page=1
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695322?page=1
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695323?page=1
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695324?page=1
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695325?page=1
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695326?page=1
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695327?page=1
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695328?page=1
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695329?page=1
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695330?page=1
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695331?page=1
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695332?page=1
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695333?page=1
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695334?page=1
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695335?page=1
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695336?page=1
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695337?page=1
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695338?page=1
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695339?page=1
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695340?page=1
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695341?page=1
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695342?page=1
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695343?page=1
[scraper.utils.mixins.http_client.mixin] (MainProcess): GET http://147.229.14.212:3001/api/v2/block/695344?page=1
```

**Příjemci podpory:**

**Poskytovatel:**

## Uživatelský manuál

Aplikace má k dispozici několik přepínačů svého konzolového rozhraní:

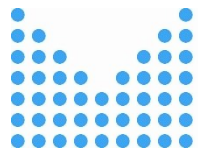
Přepínač	Význam
-h, --help	Vypíše nápovědu programu - přepínače, které jsou k dispozici a jejich použití.
--blockbook-api	<b>Vyžadováno.</b> Definuje adresy instancí programu Blockbook pro odpovídající kryptoměny. Pro Bitcoin bude hodnotou přepínače BTC, <code>http://adre.ss/api/v2</code> . Tento přepínač je možné specifikovat vícekrát pro další kryptoměny.
--vendor-name	<i>Volitelné.</i> Filtruje databázové výsledky detekovaných prodejů pouze na výsledky odpovídající jménu prodejce specifikované tímto přepínačem. Je možné využít znak % jako zástupný znak pro jakékoliv znaky.
--product-name	<i>Volitelné.</i> Filtruje databázové výsledky detekovaných prodejů pouze na výsledky odpovídající jménu produktu specifikované tímto přepínačem. Je možné využít znak % jako zástupný znak pro jakékoliv znaky.
--time-from	<i>Volitelné.</i> Filtruje databázové výsledky detekovaných prodejů pouze na výsledky detekované <i>po</i> datu a čase specifikované tímto přepínačem. Hodnotou se očekává datum a čas ve formátu ISO8601.
--time-to	<i>Volitelné.</i> Filtruje databázové výsledky detekovaných prodejů pouze na výsledky detekované <i>před</i> datem a časem specifikované tímto přepínačem. Hodnotou se očekává datum a čas ve formátu ISO8601.

## Programátorská dokumentace

Lze jej nalézt v adresáři docs po použití knihovny pdoc3 ke generování ze zdrojových souborů aplikace.

```
pipenv run pdoc3 -o docs --html . --force --skip-errors
```





Příjemci podpory:

Poskytovatel:

Výstupy programu jsou průběžně ukládány do souboru output .csv.

```

xdolej@bazar: /opt/torscraper]$ docker exec -it torscraper_app cat output.csv
vendor_name,variant_name,variant_price,variant_price_usd,stat_created_at,txid,bx_diff,out_address,out_count
NextGeneration,20 Tabs via EU STANDARD AIRMAIL,0,007996312,33,01,2021-08-12T02:33:39,094330-02,00,f9ba35674e6b95826c28e5f393c795676e779e8a84958651ad6a3fdb,-1,1.99999999755262e-09,bc1apt996d51qlyjy645ey5y6y38na9ytdfpxjg,z
NextGeneration,40 Tabs via FREE UK NDO,0,0010864817,50,54,2021-08-12T02:33:39,094330-02,00,4dfc3531e6a369ba907979b2475ec5b3a242d3d0f068806f1b1d70b1,-1,6.99999999291887e-09,bc1qfxc8capzazaw995z2dvtk7x8f33pdrkkrut,c,z
NextGeneration,30 Tabs via EU STANDARD AIRMAIL,0,0009882383,45,97,2021-08-12T02:33:39,094330-02,00,d65bdfdbd37204f9e878e8d93ed79a3c1bbaf94804fd9eef77a9a16,1,7.000000001468291e-09,30QJy6y60ntf8afbeVnD14cRR1H6JTTB4,5
NextGeneration,3.5 Grams via FREE UK NDO,0,007550863,349,99,2021-08-12T02:44:52,725664-02,00,c46e39bac126928ac358193ccdb53698bd361472f142f676c0273edf30,7,0.00000000652318e-09,127sg702z79b5vnlAK50sXN151gbyq,z
NextGeneration,2 Grams via FREE UK NDO,0,0043342081,190,99,2021-08-12T11:25:31,490299-02,00,899c129021993527c435d6a272185c1f6c5c5c38978263880040ae,-2,9.99999999680299e-10,bc1q9j35qrqz2r8p8nfa8d1p75e-p8ak4z6zth,z
NextGeneration,2 Boxes via FREE UK NDO,0,001308384,59,99,2021-08-12T11:33:08,289247-02,00,1865c1d8945381cf1c95b0c3e97f8322f788262c1e5d9a3807f768362413e,1,6.00000001118278e-09,1P1UkM8b11C7Z6964GConyM4MMap,1
NextGeneration,1 Boxes via FREE UK NDO,0,000790569,32,0,2021-08-12T11:33:08,289247-02,00,b50190c462369964b282c2eb44413560f83ef7f657f92c874fa09b3f519,1,0.00000000157452e-09,3C6J7V7FKLSuW3bFKX9sCwSv85YzK,z
NextGeneration,7 Grams via EU STANDARD AIRMAIL,0,001548832,70,0,2021-08-12T11:34:34,286460-02,00,75F9988e1d18dc0442f0a2b016c33bb527b02ed2a3848771f935d1b07,-2,2.0000000099017e-09,bc1q23kvch7z7p2r3c08c16f6z7cndw7qm3p6,z
NextGeneration,7 Grams via FREE UK NDO,0,001548832,70,0,2021-08-12T11:34:34,286460-02,00,75F9988e1d18dc0442f0a2b016c33bb527b02ed2a3848771f935d1b07,-2,2.0000000099017e-09,bc1q23kvch7z7p2r3c08c16f6z7cndw7qm3p6,z
NextGeneration,14 Grams via FREE UK NDO,0,0028794365,130,0,2021-08-12T11:34:34,286460-02,00,28976728764aac61f63a1a2937018540412cea5276c506436630046a25d0,3,5.0000000326159e-09,1HPhyKt8cWfNC4eM94Zc9wkh1LX6,1
NextGeneration,14 Grams via EU STANDARD AIRMAIL,0,0028794365,130,0,2021-08-12T11:34:34,286460-02,00,28976728764aac61f63a1a2937018540412cea5276c506436630046a25d0,3,5.0000000326159e-09,1HPhyKt8cWfNC4eM94Zc9wkh1LX6,1
NextGeneration,56 Grams via FREE UK NDO,0,011365318,514,0,2021-08-12T11:34:34,286460-02,00,563ef4e7f35a209817c18b6e23c68134e18e92e13ee97e4c5fd3c89c1,2,0.0000000062018e-09,174dcxrykrvtc2x0bJvwGmX84T9Q6,z
NextGeneration,0.5 Grams via FREE UK NDO,0,0012212687,55,0,2021-08-12T12:05:43,42982-02,00,c3153698880afF98f77F744418264071da5536777fde797843c7098a,1,3.0000000099268e-09,bc1qdg13whewjwjc53ah27f6cBy5qr1H6fxkzn,z
NextGeneration,1 Grams via FREE UK NDO,0,00224882,182,0,2021-08-12T12:05:43,42982-02,00,f35c0e513b4d926577cc396657a09c946d1243702133525f8,-2,0.000000048331e-09,1McnJX48nosduXc7Hw899MzXmVdV2,1
NextGeneration,7 Grams via FREE UK NDO,0,0046599425,210,0,2021-08-12T12:12:20,825078-02,00,d13f7f7fca8f12a9510011da0c3c3e74fc5f980565063c1264d9d886f6,-2,4.999999951472e-09,1Ecn8Q2Wb1H8EThdyUwM5k1d0s1yx,1
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xdolej@bazar: /opt/torscraper]$

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