

A large, stylized silhouette of a person's head and shoulders, facing right. Inside the silhouette, a vibrant cityscape is visible, featuring the Eiffel Tower, the Oriental Pearl Tower, and the Empire State Building, suggesting a global or multicultural theme. The background is a warm, golden-yellow gradient.

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**Introduction to
Artificial Intelligence**
Dmitry A. Zaitsev
<http://daze.ho.ua>



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A woman's silhouette is shown from the back, with her hair in a bun. Inside her head and shoulders, a city skyline is visible, featuring the Eiffel Tower, Christ the Redeemer, and the Empire State Building. The background is a warm, orange-hued sky.

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**Introduction to
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Lesson 3

Data Science: Case Study



Lesson 3

Data Science: Case Study

Stock Market Data on Yahoo

Current and historical information about world leading companies <https://finance.yahoo.com/>

Xiaomi Corporation

Xiaomi is a manufacturing company with smartphones and smart hardware connected by an IoT platform at its core

Install and run Orange

Open source machine learning and data visualization:
<https://orangedatamining.com/>

Analyze Xiaomy Stock Prises

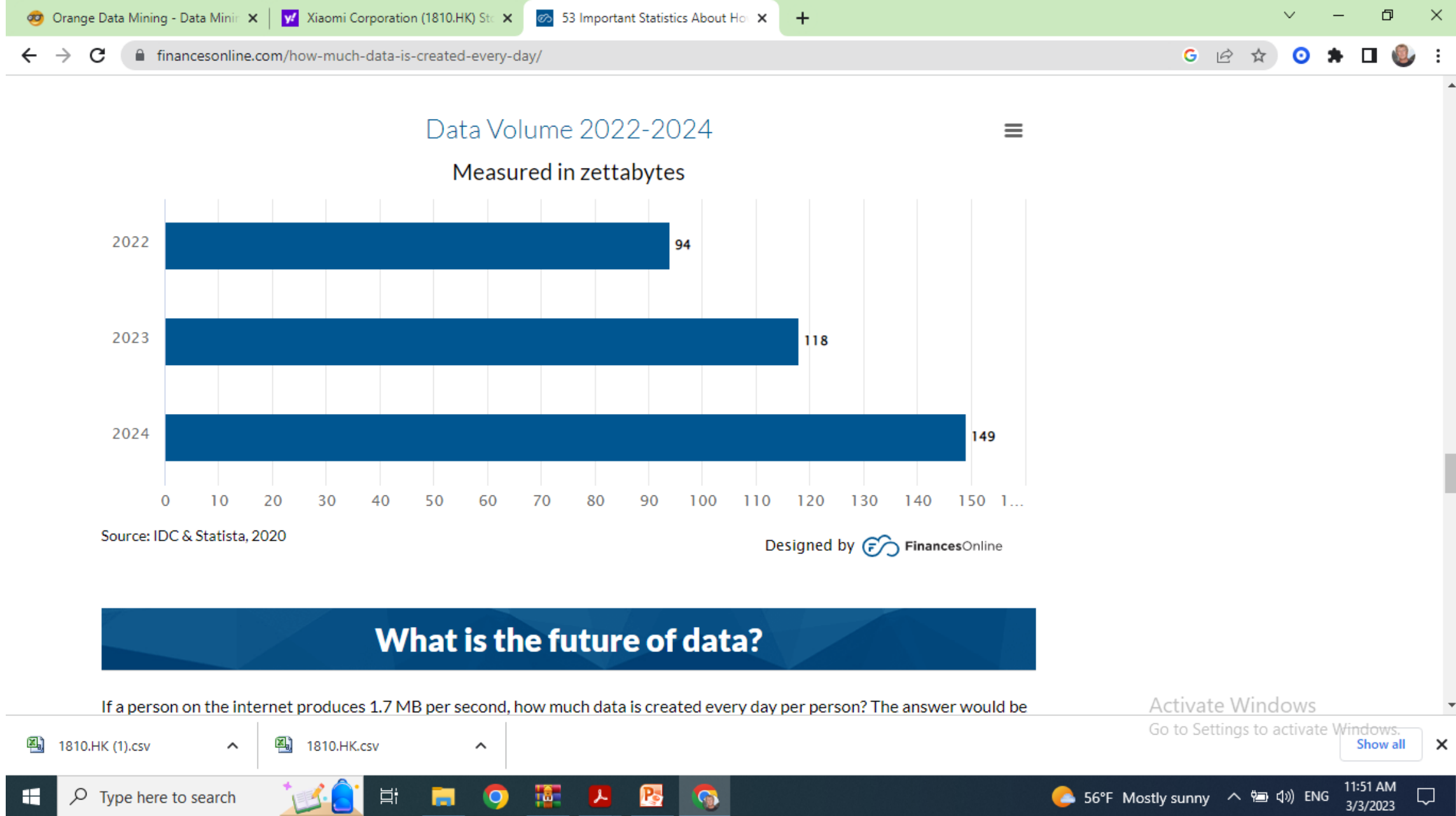
Load historical data, compute mean, variance and correlation with other companies

How to process so much data?

Phenomenon: exponential growth of data in the world

- World meters: <https://www.worldometers.info/>
- Data created statistics:
<https://financesonline.com/how-much-data-is-created-every-day/>
- Internet meters: <https://www.internetlivestats.com/>
- Economics statistics: <https://stats.oecd.org/>

Data Volume



Data science

Data Science is a broad, multidisciplinary field that aims to make sense of raw data

- **extract essential information from raw data**
- **identify trends, patterns, connections and correlations in large data sets**
- **tools and techniques: computer programming, predictive analysis, statistics and artificial intelligence, especially machine learning**

Yahoo finance

<https://finance.yahoo.com/>

- financial info on world leading companies
- brief description – Profile, Holders
- current situation description – Summary, Financials
- statistical info on recent periods of time – Statistics, Chart
- data on specified period of time – Historical Data
- forecasts – Analysis





Quote Lookup

At close: 04:08PM HKT

Sustainability

Symbol	Last Price	Change	% Change
9988.HK Alibaba Group Holding Limited	88.000	+0.400	+0.46%
3690.HK Meituan	142.300	+1.000	+0.71%

Benzinga • 4 days ago

Xiaomi Follows Meta's Quest Pro. Launches AR Glasses Leveraging

Xiaomi Corporation (1810.HK) Inc x Orange Data Mining - Data Minir x +

finance.yahoo.com/quote/1810.HK/financials?p=1810.HK

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Show: **Income Statement** Balance Sheet Cash Flow Annual Quarterly

Income Statement Currency in CNY. All numbers in thousands Expand All

Breakdown	TTM	12/30/2021	12/30/2020	12/30/2019
> Total Revenue	299,571,815	328,309,145	245,865,633	205,838,682
Cost of Revenue	248,712,678	270,048,204	209,113,771	177,284,649
Gross Profit	50,859,137	58,260,941	36,751,862	28,554,033
> Operating Expense	41,465,510	38,229,595	26,980,465	20,668,672
Operating Income	9,393,627	20,031,346	9,771,397	7,885,361
> Net Non Operating Interest Inc...	138,394	-1,611,631	-2,401,297	402,429
Pretax Income	4,014,712	24,417,033	21,633,432	12,162,646
Tax Provision	2,211,308	5,133,798	1,320,722	2,059,696
> Net Income Common Stockhold...	1,808,449	19,339,321	20,355,504	10,044,164
Average Dilution Earnings	0	-	-	0
Diluted NI Available to Com Stock...	1,808,449	19,339,321	20,355,504	10,044,164
Basic EPS	-	0.78	0.85	0.42

People Also Watch

Symbol	Last Price	Change	% Change
9988.HK Alibaba Group Holding Limited	88.000	+0.400	+0.46%
3690.HK Meituan	142.300	+1.000	+0.71%
0700.HK Tencent Holdings Limited	367.600	+4.800	+1.32%
9618.HK JD.com, Inc.	184.700	+5.600	+3.13%
0175.HK Geely Automobile Holdings Limited	10.620	+0.140	+1.34%

Earnings > Consensus EPS

54°F Sunny 11:11 AM 3/3/2023

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Statistics

Xiaomi Corporation (1810.HK) VaOrange Data Mining - Data Minir+

finance.yahoo.com/quote/1810.HK/key-statistics?p=1810.HK

yahoo!finance

Search for news, symbols or companies

Dmitry

17 Mail

SummaryChartConversationsStatisticsHistorical DataProfileFinancialsAnalysisOptionsHoldersSustainability

Valuation Measures⁴

Market Cap (intraday)	296.53B
Enterprise Value	250.67B
Trailing P/E	150.17
Forward P/E	19.46
PEG Ratio (5 yr expected)	1.48
Price/Sales (ttm)	0.82
Price/Book (mrq)	1.86
Enterprise Value/Revenue	0.84
Enterprise Value/EBITDA	47.38

Financial Highlights

Currency in CNY.

Fiscal Year

Fiscal Year Ends	Dec 31, 2021
------------------	--------------

Trading Information

Currency in HKD

Stock Price History

Beta (5Y Monthly)	N/A
52-Week Change ³	-10.32%
S&P500 52-Week Change ³	-8.72%
52 Week High ³	15.480
52 Week Low ³	8.310
50-Day Moving Average ³	12.118
200-Day Moving Average ³	11.317

Share Statistics

Avg Vol (3 month) ³	86.31M
Avg Vol (10 day) ³	69.12M
Shares Outstanding ⁵	20.39B
Implied Shares Outstanding ⁶	N/A

Gagne ton voyage

10 séjours linguistiques. 50 destinations. Gagne un voyage pour toi & ton.ta BFF!

Je participe

See [Statistics Help](#) for definitions of terms used.

Abbreviation Guide:

mrq = Most Recent Quarter

ttm = Trailing Twelve Months

yoy = Year Over Year

lfy = Last Fiscal Year

fye = Fiscal Year Ending

Footnotes

¹ Data provided by Refinitiv.

² Data provided by EDGAR Online.

³ Data provided by Refinitiv.

⁴ Data provided by Refinitiv.

⁵ Data provided by Refinitiv.

⁶ Data provided by Refinitiv.

Activate Windows
Go to Settings to activate Windows.

Type here to search

Construction 0.7 mile...

11:13 AM 3/3/2023

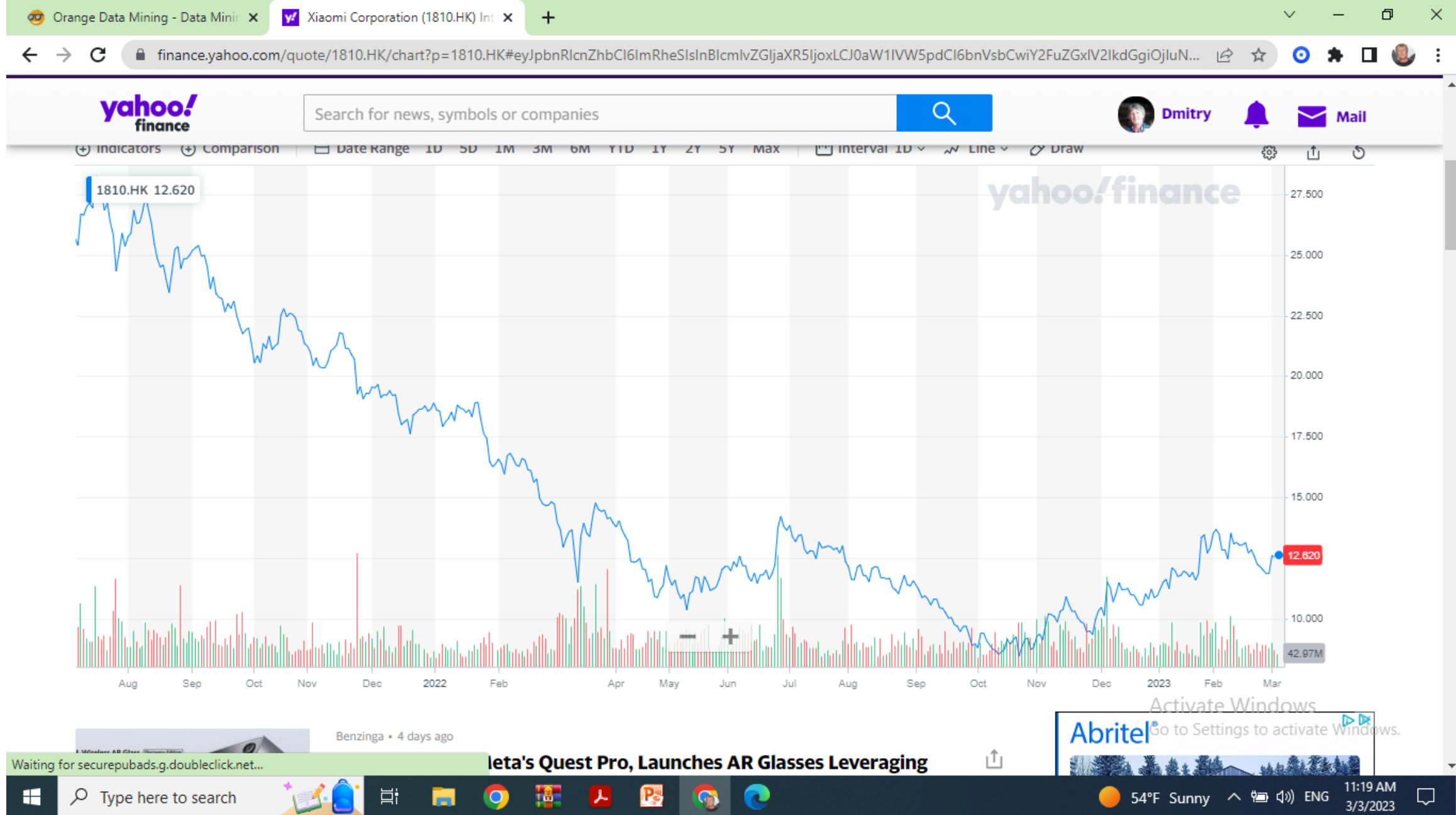
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Chart



Historical prices

Orange Data Mining - Data Mini X Xiaomi Corporation (1810.HK) St X

finance.yahoo.com/quote/1810.HK/history?p=1810.HK

yahoo! finance Search for news, symbols or companies

Time Period: Mar 03, 2022 - Mar 03, 2023 Show: Historical Prices Frequency: Daily Apply

Currency in HKD Download

Date	Open	High	Low	Close*	Adj Close**	Volume
Mar 03, 2023	12.840	12.840	12.440	12.620	12.620	42,967,550
Mar 02, 2023	12.360	12.720	12.360	12.520	12.520	59,850,698
Mar 01, 2023	11.880	12.680	11.860	12.600	12.600	85,423,517
Feb 28, 2023	11.940	12.200	11.760	11.860	11.860	67,656,036
Feb 27, 2023	11.860	12.000	11.640	11.860	11.860	78,381,408
Feb 24, 2023	12.060	12.340	11.960	12.000	12.000	76,140,115
Feb 23, 2023	12.420	12.440	12.100	12.140	12.140	53,332,904
Feb 22, 2023	12.560	12.660	12.080	12.240	12.240	86,113,597
Feb 21, 2023	12.900	13.020	12.500	12.560	12.560	62,268,840
Feb 20, 2023	12.640	13.080	12.640	12.840	12.840	46,286,725
Feb 17, 2023	13.100	13.220	12.660	12.700	12.700	75,713,458
Feb 16, 2023	13.120	13.480	13.020	13.140	13.140	74,662,669
Feb 15, 2023	13.020	13.220	12.800	13.040	13.040	64,885,244

TRY

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People Also Watch

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9618.HK JD.com, Inc.	184.700	+5.600	+3.13%

Windows Search: Type here to search

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Format CVS – Comma Separated Values

Delimited text file that uses a comma to separate values

Date,Open,High,Low,Close,Adj Close,Volume

2022-03-04,14.240000,14.300000,13.700000,13.960000,13.960000,172115195

2022-03-07,13.400000,13.920000,13.040000,13.680000,13.680000,186408382

2022-03-08,13.700000,13.980000,12.900000,12.940000,12.940000,179112275

2022-03-09,13.080000,13.540000,12.740000,13.300000,13.300000,168374161

2022-03-10,13.800000,13.900000,13.380000,13.580000,13.580000,81509483

2022-03-11,12.980000,13.880000,12.860000,13.660000,13.660000,137860658

...

Excel imports CSV file

1810.HK - Microsoft Excel

Файл Главная Вставка Разметка страницы Формулы Данные Рецензирование Вид

Вставить Буфер обмена Шрифт Выравнивание Число Стили

Общий \$ % 000 0.00 0.00

Условное форматирование Форматировать как таблицу Стили

Вставить Удалить Формат Ячейки

Сортировка и фильтр Найти и выделить Редактирование

P13

	A	B	C	D	E	F	G	H	I	J
1	Date	Open	High	Low	Close	Adj Close	Volume			
2	4-Mar-2022	14.24	14.3	13.7	13.96	13.96	172115195			
3	7-Mar-2022	13.4	13.92	13.04	13.68	13.68	186408382			
4	8-Mar-2022	13.7	13.98	12.9	12.94	12.94	179112275			
5	9-Mar-2022	13.08	13.54	12.74	13.3	13.3	168374161			
6	10-Mar-2022	13.8	13.9	13.38	13.58	13.58	81509483			
7	11-Mar-2022	12.98	13.88	12.86	13.66	13.66	137860658			
8	14-Mar-2022	13.44	13.48	12.36	12.48	12.48	169050905			
9	15-Mar-2022	11.86	12.92	11.38	11.5	11.5	267858299			
10	16-Mar-2022	12.02	13.46	11.84	13.4	13.4	277546915			
11	17-Mar-2022	14.5	14.5	13.42	13.94	13.94	209742078			
12	18-Mar-2022	13.82	13.82	13.04	13.52	13.52	154366597			

1810.HK

Готово

200%

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Orange: Open source machine learning and data visualization

<https://orangedatamining.com/>

- Install Python
- Download and install Orange
- YouTube tutorials:
<https://www.youtube.com/channel/UCIKKWBe2SCAEyv7ZNGhle4g>
- Run Orange:
 - cmd
 - `python3 -m Orange.canvas`

Example of Orange Use

testa-ex1.ows* - Orange

File Edit View Widget Options Help

Data

File CSV File Import Datasets SQL Table

Data Table Paint Data Data Info Rank

Edit Domain Color Feature Statistics Save Data

Transform

Visualize

Model

Evaluate

Unsupervised

Data Table

View the dataset in a spreadsheet.

[more...](#)

CSV File Import Data Table Scatter Plot

Data Table - Orange

Info
13 instances (no missing data)
2 features
No target variable.
No meta attributes.

Variables
☒ Show variable labels (if present)
☐ Visualize numeric values
☒ Color by instance classes

Selection
☒ Select full rows

	Date	Open
1	2022-02-01 00:00:00	311.737
2	2022-03-01 00:00:00	289.893
3	2022-04-01 00:00:00	360.383
4	2022-05-01 00:00:00	286.923
5	2022-06-01 00:00:00	251.72
6	2022-07-01 00:00:00	227
7	2022-08-01 00:00:00	301.277
8	2022-09-01 00:00:00	272.58
9	2022-10-01 00:00:00	254.5
10	2022-11-01 00:00:00	234.05
11	2022-12-01 00:00:00	197.08

Scatter Plot - Orange

Axes
Axis x: **Date**
Axis y: **Open**

Find Informative Projections

Attributes
Color: (Same color)
Shape: (Same shape)
Size: (Same size)
Label: (No labels)

Zoom/Select
☒ Send Automatically

13 | - | - | 13 | 2

Open

Date

$r = -0.83$

Activate Windows
Go to Settings to activate Windows.

56°F Mostly sunny 12:07 PM 3/3/2023

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Basic Orange concepts

Draw your workflow of data processing and visualization

- data analysis workflow
- widgets – computational units of Orange:
 - read data
 - process data
 - visualize data
- basic functions:
 - data clustering
 - build predictive models

Create workflow for Xiaomi stock prices

Analyze and visualize historical data

- **File widget – load data from file or URL**
- **Data Table widget – print table**
- **Connect widgets – data flow connecting of input-output channels – just drag a line connecting widgets**
- **Scatter Plot widget – represent (visualize) data values by dots**

Attributes and options of widgets

DoubleClick to open widget specification

- **File widget**
 - Path or URL
 - Import options – encoding, delimiter, ignore columns
- **Data Table widget**
 - visualize numeric values
- **Scatter Plot widget**
 - axes
 - attributes: color, shape, size, label; show legend, show gridlines, show regression line

Principles of Orange work

DoubleClick to open widget specification

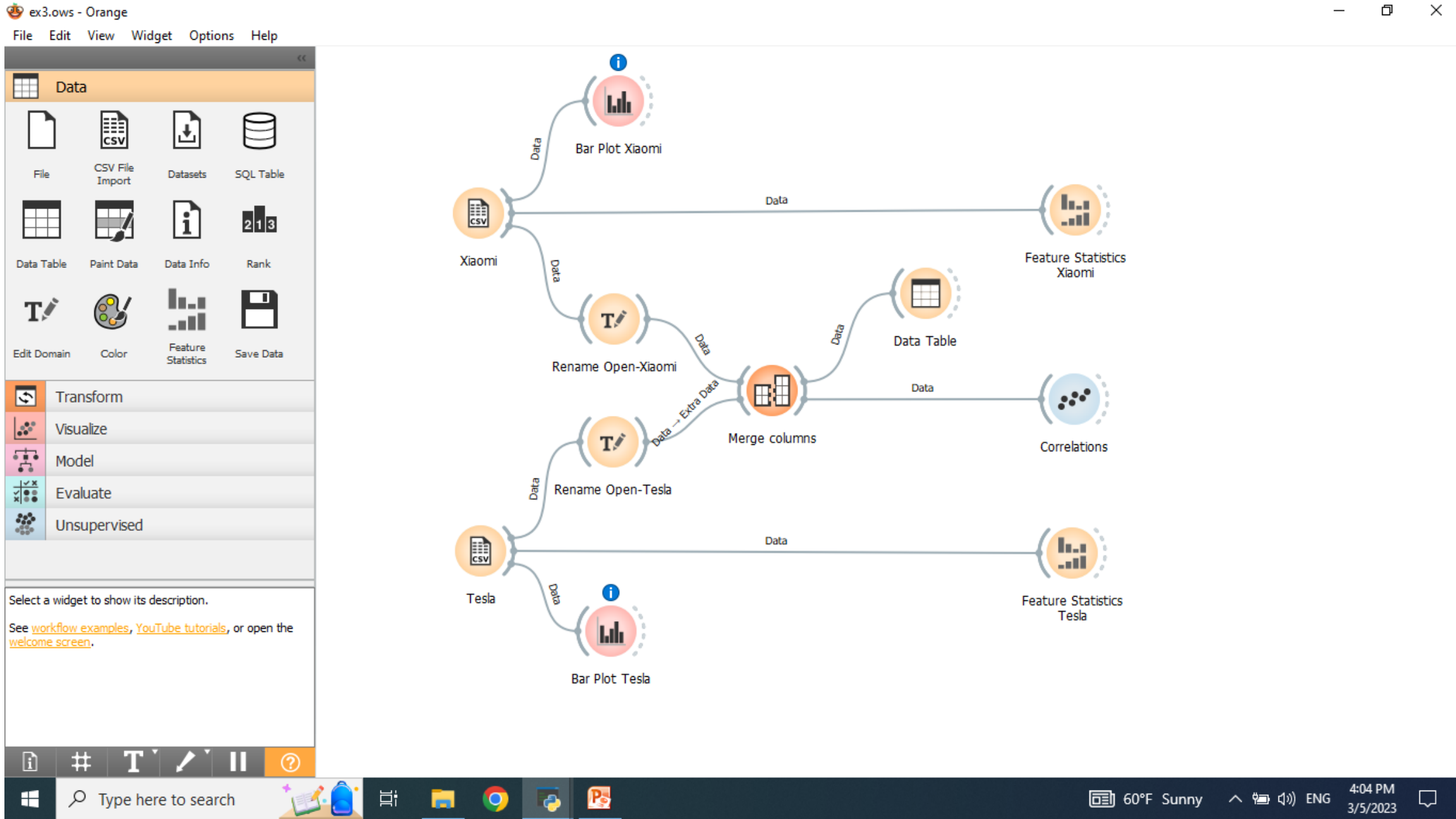
- I. Set of widget, attributes, and options**
- II. Draw workflow as a network of connected widgets**
- III. Widgets communicate with each other**
- IV. Changes in some widget are immediately propagated through the workflow**

Task 1: Create similar workflow for your company

Choose company by your student's number last digit

- 0.** Ping An Insurance (Group) Company of China
- 1.** PetroChina Co Ltd
- 2.** Airbus SE
- 3.** JD.com, Inc.
- 4.** Tesla, Inc.
- 5.** Zijin Mining Group Company Limited
- 6.** International Business Machines Corporation
- 7.** Renault SA
- 8.** Electricité de France S.A.
- 9.** Tencent Holdings Limited

Statistical analysis



Additional widgets

Adding widget for statistical analysis

- **Feature statistics widget – compute basic statistical info on a data series: mean, dispersion etc**
- **Correlation – compute correlation coefficient (mutual influence)**
- **Data transformation:**
 - **Edit domain widget – rename column**
 - **Merge data widget – merge columns**

Feature statistics

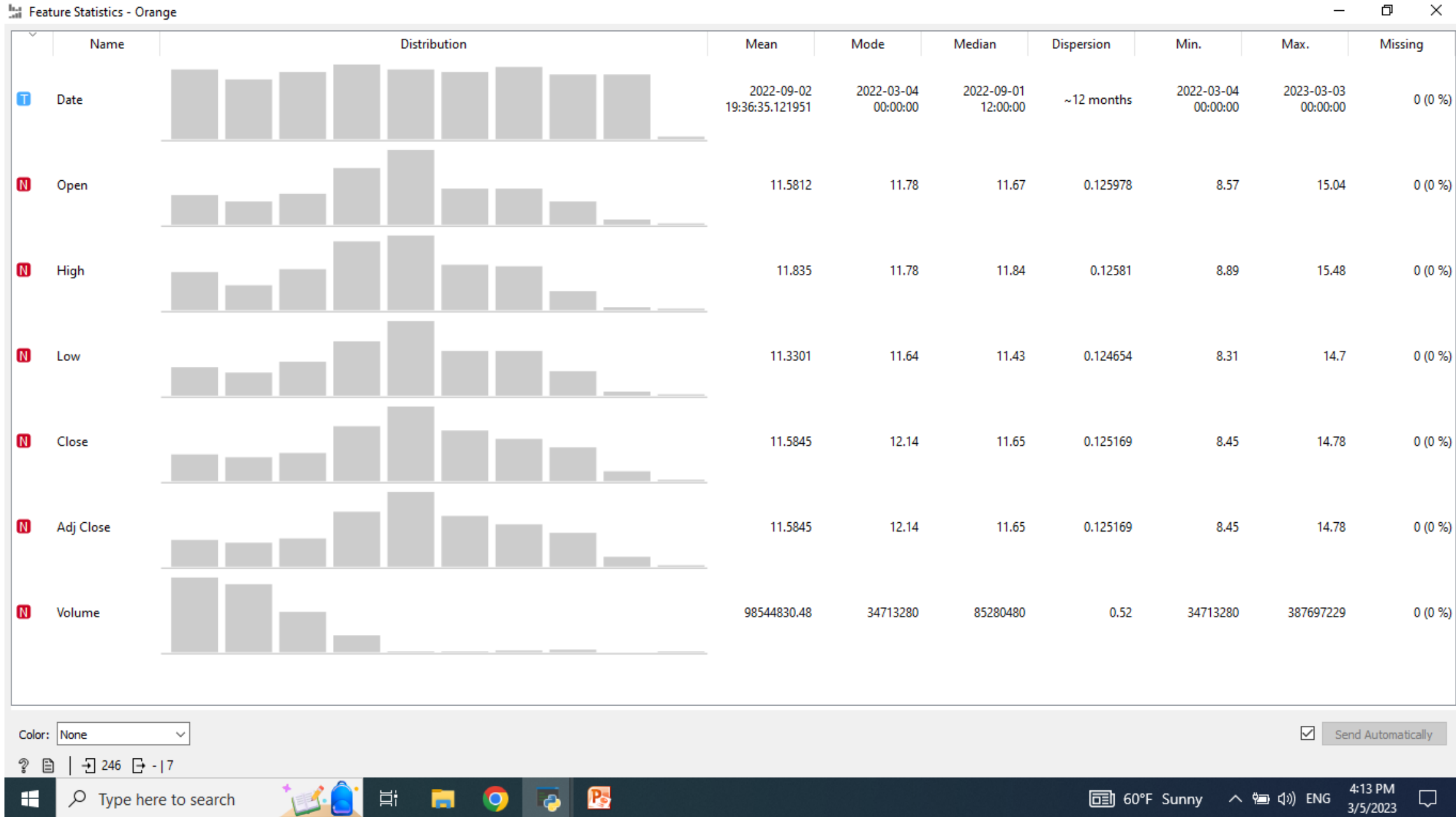


Table after renaming and merging columns

Orange Data Mining interface showing a workflow and a data table.

Workflow:

- Xiaomi (Data Source) connects to Bar Plot Xiaomi (Visualization) and Data Table (Data Table widget).
- Data Table connects to Feature Statistics Xiaomi (Statistics widget).

Data Table - Orange

Info: 246 instances (no missing data), 2 features, No target variable, No meta attributes.

Variables:

- ☒ Show variable labels (if present)
- ☐ Visualize numeric values
- ☒ Color by instance classes

Selection:

- ☐ Select full rows

	Open-Xiaomi	Open-Tesla
1	14.24	283.033
2	13.4	285.433
3	13.7	265.177
4	13.08	279.827
5	13.8	283.817
6	12.98	280.067
7	13.44	260.203
8	11.86	258.423
9	12.02	269.667
10	14.5	276.997
11	13.82	291.497
12	13.88	304.993
13	13.5	310

Task 2: Create workflow for statistical analysis of your company compared to other company

Choose other company by your student's number last digit plus 5 modulo 10

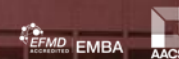
- **Compute statistical characteristics of your company**
- **Compute correlation of one column (for example, “open”) with the corresponding column of other company**
- **To compute correlation, cut and rename columns for each company, then merge column to create a joint table**
- **Formulate your conclusions and recommendations**

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<http://daze.ho.ua>



Lesson 3

Data Science: Case Study

