

ANALISA MARKET DENGAN WEBSCRAPING ULASAN PENGGUNA

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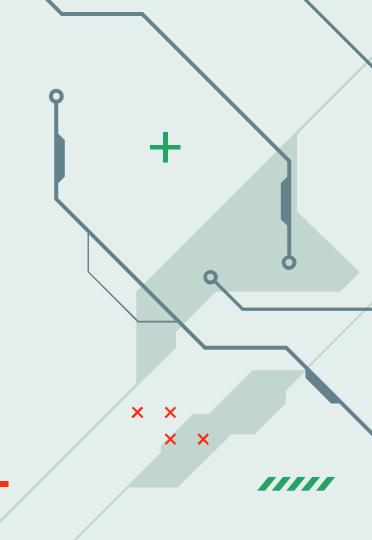
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Apa Manfaat Menganalisa Ulasan Pengguna?

Menganalisa ulasan pengguna produk memberikan banyak informasi diantaranya:

- Mengukur kepuasan pengguna
- Mengetahui kritik, saran, dan masukan pengguna
- Mengetahui masalah yang paling sering dikeluhkan
- dll



Apakah Menganalisa Ulasan Pengguna Produk Kompetitor Juga Bermanfaat?

Ya, berikut adalah beberapa manfaatnya:

- Mengidentifikasi kekuatan dan kelemahan kompetitor dari sudut pandang pengguna
- · Memahami preferensi pengguna
- Melihat peluang pasar dan mengembangkan strategi pemasaran
- dll



Apa saja tantangan yang dihadapi dalam Analisa ulasan pengguna?

Ada beberapa tantangan yang dihadapi dalam analisis ulasan pengguna, diantaranya:

- Jumlah ulasan yang sangat banyak
- Bahasa dan gaya penulisan yang variatif
- Ulasan pengguna merupakan data tidak terstruktur, maka perlu teknik khusus untuk memprosesnya



Bagaimana cara mengatasinya?

Big data engineering-lah solusinya! Berikut ini beberapa fungsi big data engineering:

- Sebagai sarana untuk mengumpulkan, menyimpan, dan memproses data
- Analisa pola dan tren, sentiment, dll
- Visualisasi dan reporting



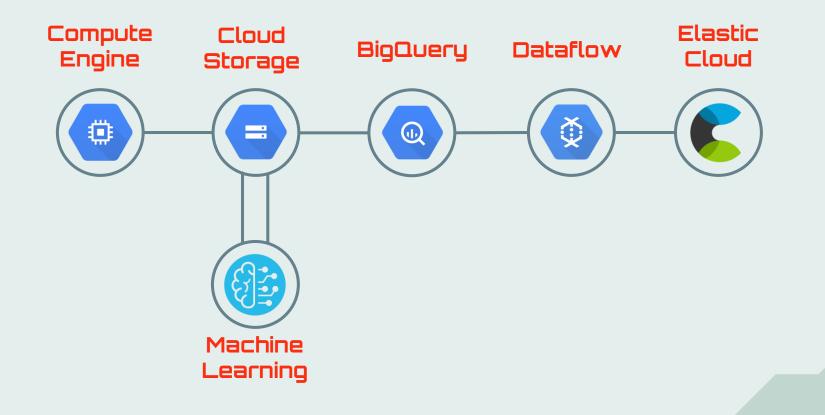
Aplikasi Yang Discrape								
Nama	Jumlah Record	Nama	Jumlah Record					
Slack	18811	Trello	13809					
Asana	8807	Microsoft Teams	140106					
Basecamp	2203	Monday.com	3655					
Jira cloud	3227	Wrike	1844					
Smartsheet	2270	Zoho projects	437					
Quire	416	Todoist	35504					
Meistertask	1982	Proofhub	259					

Sumber data ulasan

- Google play store (219834 record)
- App store (13496 record)



Data Pipeline



Alasan Menggunakan Layanan Cloud:

- Cloud provider menawarkan solusi penyimpanan dan pengelolaan data yang aman dan mudah dikelola
- Memiliki banyak fitur yang bisa digunakan untuk memenuhi kebutuhan analisa data
- Mudah diakses dimana saja sehingga memudahkan koordinasi tim
- Skema biaya yang fleksibel sesuai penggunaan



Webscraping dan Data Preprocessing×

- Buat compute engine instance jika belum ada
- Buat bucket dan foldernya di cloud storage jika belum ada
- Jalankan instance tersebut
- Buka jendela SSH
- Upload dan jalankan script python yang dibutuhkan

```
gcloud compute instances create interncicle \
          --project=belajar-bigdata \
          --zone=us-central1-a \
          --machine-type=n1-standard-1 \
          --network-interface=network-tier=PREMIUM,
      stack-type=IPV4 ONLY,subnet=default \
 6
          --maintenance-policy=MIGRATE \
          --provisioning-model=STANDARD \
 8
      --service-account=17539168950-compute@developer.
      gserviceaccount.com \
          --scopes=https://www.googleapis.com/auth/
      devstorage.read only, https://www.googleapis.com/
      auth/logging.write, https://www.googleapis.com/
      auth/monitoring.write, https://www.googleapis.com/
      auth/servicecontrol, https://www.googleapis.com/
      auth/service.management.readonly,https://www.
      googleapis.com/auth/trace.append \
10
          --tags=http-server,https-server \
          --create-disk=auto-delete=yes,boot=yes,
11
      device-name=interncicle,image=projects/
      debian-cloud/global/images/
      debian-11-bullseye-v20230509, mode=rw, size=10,
      type=projects/belajar-bigdata/zones/us-central1-a/
      diskTypes/pd-balanced \
12
          --no-shielded-secure-boot \
13
          --shielded-vtpm \
          --shielded-integrity-monitoring \
14
15
          --labels=goog-ec-src=vm add-gcloud \
          --reservation-affinity=any
16
```

Scraping Playstore

```
playstore_scraper.py X
D: > kerja > internship cilsy > script > 🏓 playstore_scraper.py
      from tadm import tadm
      from pygments import highlight
      from google play scraper import Sort, reviews, app, reviews all
      bucket = storage client.get bucket("intern cicle")
      output file path = "scraping result"
      app packages = [
      def print json(json_object):
               json object,
```

- Script untuk melakukan webscraping ulasan dari google playstore
- Akan mengambil maksimal 200000 ulasan yang paling relevan per aplikasi dalam bahasa inggris.
- Data ulasan disimpan dalam bentuk csv di cloud storage
- Untuk menjalankan script ini perlu mengetik command line di compute engine:
- python playstore_scraper.py

Scraping Playstore

```
json object,
        sort keys=False,
app reviews mr = []
for ap in tqdm(app packages):
        sort=Sort.MOST RELEVANT,
        count= 200000, #if score == 3 else 100,
        r['source'] = 'playstore'
    app reviews mr.extend(rvsa)
    sleep(5)
app reviews df = pd.DataFrame(app reviews mr)
app_reviews_df["content"] = app_reviews_df["content"].str.replace('\n', '')
app reviews df["content"] = app reviews df["content"].str.replace('\'', '')
app reviews df["replyContent"] = app reviews df["replyContent"].str.replace('\n', '')
app_reviews df["replyContent"] = app_reviews df["replyContent"].str.replace('\'', '')
app reviews df.to csv('/tmp/relevant play store reviews.csv', index=None, header=True)
output bucket = storage client.get bucket(bucket name)
output blob.upload from filename('/tmp/relevant play store reviews.csv')
os.remove('/tmp/relevant play store reviews.csv')
```

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Scraping Playstore



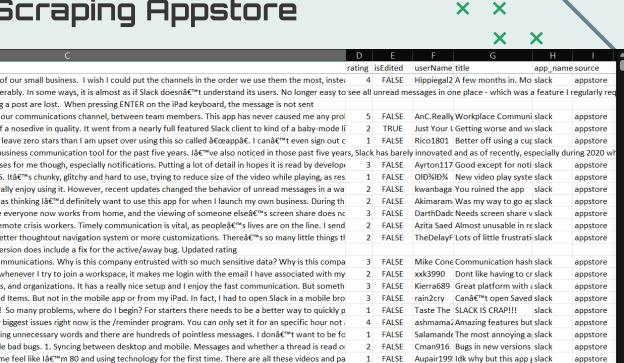
A	В	C D	E F	G	H		J	K	L	M
1 reviewId	userName	userImage content	score thumbs	Up reviewCre	at	replyContent	repliedAt	appVersion	appld	source
412 5af88c81-	Janis Millik	https://pla I have been spending 2 hours trying To get Slack to download. Just little colored circles for 2 hours	1	0 23.03.30.0	23/03/2023 19:14	Hi there, we re very sorry	23/03/2023 19:39	23.03.30.0	com.Slack	playstore
413 bcded781-	NY 989	https://pla Its discord but more professional and less features, there are better apps	2		13/04/2023 06:05			23.04.10.0		
414 5e5dd6e8-	Antonio B	https://pla Some notifications arrive a bit late but the app still works great	4	0 23.03.40.0	04/04/2023 18:57	Hi there, Please navigate	04/04/2023 19:03	23.03.40.0	com.Slack	playstore
415 7317b360-	Osama All	https://pla Login is extremely complicated, why do I have to start login on the browser?!!	1	0 23.03.40.0	31/03/2023 08:48	On desktop, authenticati	31/03/2023 11:36	23.03.40.0	com.Slack	playstore
416 c4205e72-	Brian Grah	https://pla Lots of little bugs making it harder and harder to use on phone app	2	0 23.03.30.0	20/03/2023 21:30	Hello! We d be interested	20/03/2023 21:51	23.03.30.0	com.Slack	playstore
417 8b56dcf7-	Shivani Ga	https://pla I am not getting DMs which is my need. Other than that it gives all of the notifications.	1	0 23.04.10.0	08/04/2023 21:41	We re sorry for the troub	08/04/2023 21:51	23.04.10.0	com.Slack	playstore
418 03b8edf7-	Arthur Lim	https://pla App works ok most of the time but it wont let me upload pictures	2	0 23.04.40.0	01/05/2023 23:36	We re sorry for the troub	01/05/2023 23:42	23.04.40.0	com.Slack	playstore
419 fc9c5325-l	PathToExi	https://pla Emojis are a bit bugged. Otherwise great!	4	0 23.03.50.0	06/04/2023 16:12	Hello! We d be interested	06/04/2023 18:15	23.03.50.0	com.Slack	playstore
420 166fee5f-	Avinava Ba	https://pla Recent update has been absolutely trash Emojis not loading too.	3	0 23.04.10.0	13/04/2023 19:36	Sorry to hear about the t	13/04/2023 19:56	23.04.10.0	com.Slack	playstore
421 48290ff1-8	Rod Schub	https://pla Keeps circling back to page not found as cant work out if it wants to access app or Web.	2	0 23.03.40.0	17/04/2023 14:28	Hello! We d be interested	17/04/2023 14:31	23.03.40.0	com.Slack	playstore
422 f1a2bed0-	Sean D	https://pla Images get stuck in the queue and will never upload and they take up the entire chat box	1	0 23.04.10.0	10/04/2023 11:12	Hi there, we re very sorry	10/04/2023 13:39	23.04.10.0	com.Slack	playstore
423 fa0e4a09-	Marina Gr	https://pla All imojis have disappeared and instead grey square is shown	1	0 23.03.50.0	01/04/2023 18:50	Hi Marina, We recomme	01/04/2023 19:12	23.03.50.0	com.Slack	playstore
424 c946536c-	Ross Plank	https://pla Worked initially, but it routinely gives me a blank screen.	2	0 23.03.40.0	28/03/2023 06:03	Apologies for the trouble	28/03/2023 06:05	23.03.40.0	com.Slack	playstore
425 5448fc1e-	Hoang Mid	https://pla Once installed, please note that you cannot logout from the app anymore	1	0 23.04.10.0	14/04/2023 00:27	Sorry to hear about the t	14/04/2023 00:37	23.04.10.0	com.Slack	playstore
4 <mark>26</mark> f5eba9a8-	Oluchi Nke	https://pla I really love everything about this app, except for one thing								
4 <mark>27</mark> ffe8d6f1-9	MatÃ-as F	https://pla Great UI, Awful experience. The app is really useful and good looking, but does that matter for	2	59 20.12.10.0	21/12/2020 22:07			20.12.10.0	com.Slack	playstore
428 1d59ab43-	oli sd	https://pla Call button broken on the phone, to take a picture it is very tedious (inspire yourself from What	2	11 22.09.30.0	28/09/2022 20:18	Hi Olivier, we'd be int	28/09/2022 20:26	22.09.30.0	com.Slack	playstore
429 9d7bf7e3-	Thomas A	https://pla Barely functional, wraught with bugs. This app doesnt update messages, its very poorly integra	ted into slack e	cosystem with	major sync issues.	Looks very bad when bos	s mssgs and you dor	t reply! Not	ifications d	lont work
430 ef61efe7-2	Marcela V	https://pla Its a great app but sometimes it just stops and I cant scroll or type. Cleaning the cache can hel	5	40 22.01.11.0	16/01/2022 23:09	Thank you for your feedl	17/01/2022 16:08	22.01.11.0	com.Slack	playstore
4 <mark>31</mark> 3487113f-	A Google u	https://pla Usefull corporate app and a standard in the industry. Though I hate that the app is not android	3	19 2.67.0	23/09/2018 18:11	Sorry for the confusion to	here. This is a settin	g you can ch	nange if you	ı head to Se
432 55b54fac-	Mike Vaso	https://pla Very buggy thing. Cannot join to new workspaces with invitation links: shows "Uh oh somethin	2	2 21.02.10.0	27/04/2021 14:56	Hi Mukha, Sorry to hear a	27/04/2021 15:29	21.02.10.0	com.Slack	playstore
4 <mark>33</mark> eed98849-	Tellef Ãn	https://pla The WYSIWYG message field is not well implemented and relies on user input patterns that do	1	44 20.05.21.0	09/06/2020 08:48	Thanks for the feedback	04/06/2020 04:10	20.05.21.0	com.Slack	playstore
434 1291108f-	Andrew G	https://pla The new layout continues to be annoying to navigate, but thankfully a few bugs have been pat	ched. The phor	es back button	still closes the app	, which is heinous. The big	gest boon for me h	as been disc	overing the	e clear cache
4 <mark>35</mark> 073fe02c-	Ethan Heri	https://pla New bug appeared last week. I cant open any channels in my workspace without the app crasl	1	1 23.01.40.0	06/02/2023 19:51	Hi there, We d be interes	06/02/2023 19:59	23.01.40.0	com.Slack	playstore
4 <mark>36</mark> 3f6369de-	Jasmita Sa	https://pla Im stuck in this infinite loop of "sign in on the browser" which leads to "download the app" wh	1	1 23.02.30.0	17/02/2023 22:09	We re sorry for the troub	17/02/2023 22:26	23.02.30.0	com.Slack	playstore
4 <mark>37</mark> 4ee13e0a-	Huzaifa Ri	https://pla Excellent app. Feedback Kindly add two features 1. Option to Crop and add text to image. 2.	5	1 23.01.40.0	10/02/2023 17:45			23.01.40.0	com.Slack	playstore
438 c4f16b6f-4	Aakash P	https://pla The usual story of these tech companies. Everythings working fine and they mess things up wit	2	1 23.02.30.0	21/02/2023 09:52	We re sorry that some of	21/02/2023 10:07	23.02.30.0	com.Slack	playstore
439 53e057db-	Anand Pat	https://pla Love the product on web, but recently became unusable for me. Every time I try to DM or sear	1	2 23.01.40.0	04/02/2023 07:16	Sorry to hear of the troul	04/02/2023 07:48	23.01.40.0	com.Slack	playstore
440 9c2efed4-	Mihai Dusi	https://pla The functionalities of the app are quite good, but without working notifications, the app is utter	3	3 23.01.40.0	27/01/2023 20:38	Sorry to hear about the t	27/01/2023 20:49	23.01.40.0	com.Slack	playstore
441 80461b6d-	Pankaj Kar	https://pla App is laggy,slow and continuously getting pop up slack isnt responding. which resulted close a	1	1 23.01.40.0	02/02/2023 08:27	Apologies for the trouble	02/02/2023 08:56	23.01.40.0	com.Slack	playstore
442 884315fd-	Rahul D	https://pla Please allow trello links to open directly in trello app instead of going through atlassian. This is	1	4 23.01.10.0	07/01/2023 12:22			23.01.10.0	com.Slack	playstore
443 edd1df3f-d	Marcus Sia	https://pla Posts keep reappearing after Ive read them and mark them as read. Very frustrating as Im con	2	1 23.02.40.0	27/02/2023 13:41	Hi Marcus, We recomme	27/02/2023 15:05	23.02.40.0	com.Slack	playstore

Scraping Appstore

```
appstore_scraper.py X
D: > kerja > internship cilsy > script > 🕏 appstore_scraper.py
      from app store scraper import AppStore
      bucket = storage_client.get_bucket("intern_cicle")
      output file path = "scraping result"
      app reviews=[]
      app names = ['slack', 'trello', 'asana', 'microsoft-teams', \
                    'meistertask', 'proofhub']
       for name in app names:
               app = AppStore(country="us", app name=name)
               app.review(how many=2000)
                   review 'app name' = name
                   review['source']='appstore'
               app reviews.extend(app.reviews)
               sleep(60)
      app reviews df = pd.DataFrame(app reviews)
      app_reviews_df["review"] = app_reviews_df["review"].str.replace('\n', ' ')
      app reviews df["review"] = app reviews df["review"].str.replace('\'', '')
       app reviews df["title"] = app reviews df["title"].str.replace('\n', ' ')
```

- Script untuk melakukan webscraping ulasan terbaru dari appstore
- Akan mengambil maksimal 2000 ulasan per aplikasi dalam bahasa inggris
- Data disimpan dalam bentuk csv di cloud storage
- Untuk menjalankan script ini perlu mengetik command line di compute engine:
- python appstore_scraper.py

Scraping Appstore



1 A	В	D	E	F	G	Н	
date	developerI review	rating	isEdited	userName	title	app_name	source
19/11/2021 15:37	(id': 2638; The app is easy to learn and has become an integral part of our small business. I wish I could put the channels in the order we use them the most, inste	4	FALSE	Hippiegal2	A few months in. M	o slack	appstore
14/04/2022 14:50	The recent iPad App update misses the mark quite considerably. In some ways, it is almost as if Slack doesn't understand its users. No longer easy to	see all	unread m	essages in o	ne place - which was	a feature I	regularly req
31/10/2022 09:26	'id': 3291/ When resizing the window of Slack, the changes to editing a post are lost. When pressing ENTER on the iPad keyboard, the message is not sent						
16/06/2021 23:48	I love slack. I started using slack in January for my job, as our communications channel, between team members. This app has never caused me any pro	5	FALSE	AnC.Really	Workplace Commu	ni slack	appstore
05/08/2022 01:50	lid': 3127{ Post-acquisition the Slack iOS app has taken something of a nosedive in quality. It went from a nearly full featured Slack client to kind of a baby-mode l	2	TRUE	Just Your U	Getting worse and v	veslack	appstore
04/05/2023 00:35	Absolutely awful. I am almost more upset that I can't leave zero stars than I am upset over using this so called "appâ€. I can't even sign out o	1	FALSE	Rico1801	Better off using a cu	ır slack	appstore
03/12/2020 15:39	Look, I love/d Slack. I've been using it as my internal business communication tool for the past five years. I've also noticed in those past five year	rs, Slack	has barel	y innovated	and as of recently, e	specially du	ring 2020 wh
07/06/2020 16:17	Overall the app works quite well. Some things are big misses for me though, especially notifications. Putting a lot of detail in hopes it is read by develop	3	FALSE	Ayrton117	Good except for no	ti slack	appstore
24/09/2021 12:51	('id': 2532(New video system is really bad on iOS, iPadOS and macOS. It's chunky, glitchy and hard to use, trying to reduce size of the video while playing, as re	1	FALSE	OIĐ¾IĐ¾	New video play syst	e slack	appstore
13/04/2022 02:52	lid': 29164 Slack is an indispensable tool at my company, and I generally enjoy using it. However, recent updates changed the behavior of unread messages in a wa	2	FALSE	kwanbaga	You ruined the app	slack	appstore
19/09/2021 04:22	When I first started using slack back in Feb 2019, IIRC, I was thinking I'd definitely want to use this app for when I launch my own business. During th	2	FALSE	Akimaram	Was my way to go a	ar slack	appstore
21/04/2021 23:13	l'id': 2241€ My dev team has been leaving slack more and more since everyone now works from home, and the viewing of someone else's screen share does n	3	FALSE	DarthDado	Needs screen share	v slack	appstore
02/12/2022 14:41	('id': 3351ई I used to LOVE slack. I manage a company with 47 fully remote crisis workers. Timely communication is vital, as people's lives are on the line. I send	2	FALSE	Azita Saed	Almost unusable in	re slack	appstore
17/08/2020 23:17	('id': 17374The Slack service is great but the ios app needs either a better thoughtout navigation system or more customizations. There's so many little things t	2	FALSE	TheDelayF	Lots of little frustra	ticslack	appstore
10/03/2021 03:28	lid': 2155(Updated Review: Dev team responded and the newest version does include a fix for the active/away bug. Updated rating						
13/09/2020 18:46	Slack is like a giant meat pie of an entire organizations communications. Why is this company entrusted with so much sensitive data? Why is this company	3	FALSE	Mike Cone	Communication has	h slack	appstore
14/09/2021 19:38	'id': 2512{ My school has a slack license and I use it for classes, but whenever I try to join a workspace, it makes me login with the email I have associated with my	2	FALSE	xxk3990	Dont like having to	cr slack	appstore
08/02/2020 15:32	I've been using slack for a year now with work, classes, and organizations. It has a really nice setup and I enjoy the fast communication. But someth	3	FALSE	Kierra689	Great platform with	a slack	appstore
15/06/2020 14:13	I AM able to open links on the Desktop site from my Saved Items. But not in the mobile app or from my iPad. In fact, I had to open Slack in a mobile bro	3	FALSE	rain2cry	Can't open Save	d slack	appstore
31/07/2022 00:15	Hate how difficult it is to get anything done with this app! So many problems, where do I begin? For starters there needs to be a better way to quickly	1	FALSE	Taste The	SLACK IS CRAP!!!	slack	appstore
07/01/2023 18:26	lid': 3415(There are new features added all the time, but one of my biggest issues right now is the /reminder program. You can only set it for an specific hour not	4	FALSE	ashmama2	Amazing features bu	ut slack	appstore
09/05/2023 05:18	I hate this app because everyone at work is constantly using unnecessary words and there are hundreds of pointless messages. I don't want to be for	1	FALSE	Salamande	The most annoying	aslack	appstore
21/07/2022 13:30	(id': 3105) Used to be more stable. The newer versions have a couple bad bugs. 1. Syncing between desktop and mobile. Messages and whether a thread is read o	2	FALSE	Cman916	Bugs in new version	s slack	appstore
22/08/2020 18:29	('id': 1744(I really want to like it. But l'm 25 and this app makes me feel like l'm 80 and using technology for the first time. There are all these videos and pa	1	FALSE	Aupair199	Idk why but this app	€ slack	appstore
06/12/2022 23:59	I never feel this like strong desire to write reviews but i am now- Slack is a wonderful group workspace app. A lot of the complaints seen are due to A	5	FALSE	akandyyy	An amazing FREE wo	oı slack	appstore
14/11/2019 17:40	Using slack is easy, it's convenient and I recommend it. The ONE thing that I wish were different is the DMs. I'm in THREE separate workspaces were the DMs. I'm in THREE separate were the DMs. I⧙m in THREE separate workspaces were the DMs. I⧙m in THREE separate workspace	5	FALSE	lilakay	Slide into my DMs	slack	appstore
19/09/2017 04:10	We use in our small law office. We had to write some of our own "best practice rules" (like phone message channels only get phone messages, no gifs i	5	FALSE	hatwife12	Great tool	slack	appstore
28/09/2022 21:14	('id': 3231: Mobile Slack worked fine for me for years, until the last 3 months or so - now, I pretty much exclusively use the desktop app, because some reason, my	1	FALSE	1beckett	Missing messages??	(slack	appstore
28/05/2020 15:37	I like the platform, but the UIs on the various platforms - and especially iOS / iPadOS - are getting worse, not better, with every update. They are ultim	2	FALSE	SquidlyMa	Like the platform, U	II: slack	appstore
29/07/2020 21:43	So far, this app hasn't done anything bad per se. It gets the job done, just a basic app for work. However, I wish you could choose what kind of mess	4	FALSE	Loose_eel	So far, so good, son	ne slack	appstore
21/01/2020 21:09	id: 1308. This app is satisfactory functional, but thats not why Im writing this review. Rather, when it comes time to update the app, the staff at slack gives us inf	5	FALSE	impressed	Going the extra mile	slack	appstore
13/07/2018 15:39	First, my rant (feel free to skip): I was not pleased when Microsoft purchased Skype, and my fears were increasingly justified as I saw version release af	5	FALSE		Becoming my go to		appstore

```
data_preprocessing.py X
D: > kerja > internship cilsy > script > 🏓 data_preprocessing.py
      storage client = storage.Client()
      bucket = storage client.get bucket("intern cicle")
      input file path = "scraping result"
      output file path = "cleaned data"
      blob = bucket.blob(input file path)
      blob.download to filename('/tmp/relevant play store reviews.csv')
      df1 = pd.read csv('/tmp/relevant play store reviews.csv')
       rename dict = {'com.Slack':'slack',
           'com.basecamp.bc3':'basecamp',
           'com.smartsheet.android':'smartsheet',
           'com.zoho.projects':'zoho projects',
           'com.proofhub':'proofhub'}
      df1['appId']=df1['appId'].replace(rename dict)
      df1['review date'] = pd.to datetime(df1['at'])
      df1['title']=None
      df1['edited']=None
      df1=df1.drop(['userImage', 'repliedAt', 'at', 'appVersion'], axis=1)
```

- :5511 IY
 - Script untuk menggabungkan dan membersihkan data hasil webscraping playstore dan appstore
 - Dilakukan perubahan nama kolom yang berbeda namun sama isinya
 - Pembuatan kolom baru yang tidak ada pada salah satu data
 - Menghapus kolom yang tidak dibutuhkan



```
df2 = pd.read csv('/tmp/app store reviews.csv')
df2['review date'] = pd.to datetime(df2['date'])
df2['reply'] = df2['developerResponse']\
                .apply(lambda x: ast.literal eval(x) if pd.notnull(x) else None)
df2['reply'] = df2['reply'].apply(lambda x: x['body'] if pd.notnull(x) else None)
df2["reply"] = df2["reply"].str.replace('\n', ' ')
df2["reply"] = df2["reply"].str.replace('\'', '')
df2['id']=None
df2['thumbs up count']=None
df2['app version']=None
df2['source'] = 'appstore'
df2=df2.drop(['date','developerResponse'], axis=1)
rename dict = {'microsoft-teams':'microsoft teams'}
df2['app name']=df2['app name'].replace(rename dict)
rename column={'isEdited':'edited',
df2=df2.rename(columns=rename column)
df2 final=df2[['id',
               'username',
               'rating',
               'review'.
               'review date',
               'app version',
               'thumbs up count',
```

- Melakukukan unnesting pada kolom yang nilainya berupa dictionary
- Mengubah nilai-nilai yang sama namun berbeda penulisannya antara kedua data

```
dt1 tinal = dt1 tinal.append(dt2 tinal, ignore index=True)
df1 final["username"] = df1 final["username"].str.replace('\n', ' ')
df1 final["username"] = df1 final["username"].str.replace('\'', '')
df1 final["username"] = df1 final["username"].str.replace(';', ' ')
df1 final["title"] = df1 final["title"].astype(str)
df1 final["title"] = df1 final["title"].apply(lambda x: sub('[^\w\s]', ' ', x))
                   = df1_final["title"].replace(r'\s+', ' ', regex=True)
df1 final["title"]
df1 final["title"]
                   = df1 final["title"].str.strip()
df1 final['title']
                    df1 final['title'].str.lower()
df1 final['title'] = df1 final["title"]\
                            .apply(lambda x: ''.join([" " if ord(i) < 32 or ord(i) > 126 else i for i in x]))
df1 final["review"] =
                      df1 final["review"].astype(str)
df1 final["review"]
                      df1 final["review"].apply(lambda x: sub('[^\w\s]', ' ', x))
                     = df1 final["review"].replace(r'\s+', ' ', regex=True)
df1 final["review"]
df1 final["review"]
                      df1 final["review"].str.strip()
df1 final['review']
                      df1 final['review'].str.lower()
df1 final['review']
                    = df1 final["review"]\
                            .apply(lambda x: ''.join([" " if ord(i) < 32 or ord(i) > 126 else i for i in x]))
df1 final["reply"] = df1 final["reply"].astype(str)
df1 final["reply"]
                   = df1 final["reply"].apply(lambda x: sub('[^\w\s]', ' ', x))
                   = df1 final["reply"].replace(r'\s+', ' ', regex=True)
df1 final["reply"]
                   = df1 final["reply"].str.strip()
df1 final["reply"]
df1 final['reply']
                    df1 final['reply'].str.lower()
df1 final['reply'] = df1 final["reply"]\
                            .apply(lambda x: ''.join([" " if ord(i) < 32 or ord(i) > 126 else i for i in x]))
df1 final.to csv('all app reviews.csv', index=None, header=True)
output bucket = storage client.get bucket(bucket name)
output blob = output bucket.blob(output file path)
output blob.upload from filename('/tmp/all app reviews.csv')
os.remove('/tmp/relevant play store reviews.csv')
os.remove('/tmp/app store reviews.csv')
```

- Menghapus tanda baca, newline, spasi berlebih, emoticon, & karakter ASCII pada kolom bertipe teks
- Mengubah semua huruf pada kolom bertipe teks menjadi huruf kecil
- Setelah itu data digabungkan dalam satu dataframe dan disimpan kembali dalam bentuk csv yang baru di cloud storage
- Untuk menjalankan script ini perlu mengetik command line di compute engine:
- python data_preprocessing.py



D44B60ff-Sean N. 1 3 none terrible experience on mobile if you have anything less than a perfect connection you receive messages and theyre not visible you set 11/05/2023 15:58 23.04.0.0. 1 4 none for a couple months now we noticed that my notification on my phone that is received a new message but it wit 01/05/2023 15:58 23.04.0.0. 4 4 hia ndrew slack play 122610-11 in the subject of the part of											•	
this app is absolutely terrible when clicking to close conversations they dont close notifications come through minutes later then wh 23/05/2023 14:41 23.05.3.00 this app is absolutely terrible when clicking to close conversations they dont close notifications come through minutes later then wh 23/05/2023 14:42 23.05.3.00 the desperance on mobile if you have anything less than a perfect connection you necesive messages and theyer not visible you as 11.05/2023 14:32 23.05.4.00 4 his andrew slack play 10/32.05.05.05.05.05.05.05.05.05.05.05.05.05.	4	А	В	С		E	F		H I	J	K	L
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rlasS8002	044	b60ff-(Sean N.	3 ו	none	terrible experience on mobile if you have anything less than a perfect connection you receive messages and theyre not visible you se 1	1/05/2023 14:47	23.04.40.0	17	hello we d	slack	playstore
10.21.6.1. Chili Cao	2 fb00)317b-	Andrew Ge	3 1	none	way to slow on mobile in regards to fetching dm data i will get a notification on my phone that ive received a new message but it we 1	10/05/2023 15:58	23.04.40.0	4	hi andrew	slack	playstore
312de100 Sjoerd Kus 2 none images on the app are blurry when downloading the file becomes corrupted on desktop and web the image loads fine its possible to 28/03/20/3 21-42 23.03.40.0 5 hello we rislack play 564758e9-Aravind \(\) in none from last 6 months in complaining to the surpport team that notifications are rive but may also as the prairies of the surpport team that notifications are rive but may also as the prairies of the surpport team that notifications are rive but may also as the prairies of the surpport team that notifications are rive but may also as the prairies of the surpport team that notifications are rive but may also as the prairies of the surpport team that notifications are rive but may also as the prairies of the surpport team that notifications are rive but may also as the prairies of the surpport team that notifications are rive but may also as the prairies of the surpport team that notifications are rive but may also as the prairies of the surpport team that notifications are rive but may also as the prairies of the surpport team that notifications are rive but may also as the prairies of the surpport team that notifications are rive but may also as the prairies of the surpport team that notifications are rive but may also as the prairies of the surpport team that notifications are rive but may also as the prairies of the surpport team that notifications are rive but may also as the prairies of the surpport team that notifications are rive but may also as the prairies of the surpport team that notifications are rive but may also as the prairies of the surpport team that notifications are rive but may also as the prairies of the surpport team that notifications are rive but may also as the prairies of the surpport team that notifications are rive but may also as the prairies of the surpport team that notifications are rive but the surpport team that notifications are rive but the past surpport team that notifications are also as the surpport team that notifications are also as the sur	3 fd8	80b2-		4 1	none	for a couple months now ive noticed that my notification schedule isnt being respected even though the app says i wont get notifical	01/06/2023 08:25	23.05.41.0	0	hello we d	slack	playstore
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			_									

Wordcloud Visualization

```
# Function to remove stopwords from a text string
def remove stopwords(text):
   if isinstance(text, str):
       tokens = word tokenize(text)
       filtered tokens = [token for token in tokens \
                           if token.lower() not in stopwords_list]
       return ' '.join(filtered_tokens)
   else:
        return np.nan
# Apply the stopwords removal function to the desired column
df['review'] = df['review'].apply(remove stopwords)
from wordcloud import WordCloud
import matplotlib.pyplot as plt
# Combine the 'review' column into a single string
text = ' '.join(df['review'].astype(str))
# Generate the word cloud
wordcloud = WordCloud(width=800,
                      height=400,
                      max font size=80,
                      max words=5000,
                      background color='white').\
                      generate(text)
# Plot the word cloud
plt.figure(figsize=(18, 18))
plt.imshow(wordcloud, interpolation='bilinear')
plt.axis('off')
plt.show()
```

- Jauzauvii
- Wordcloud merupakan suatu visualisasi artistik yang menampilkan kata/frasa pada kumpulan data teks dimana kata yang semakin sering muncul akan ditampilkan lebih besar
- Wordcloud berguna untuk mencari kata/frasa yang dominan pada suatu data teks yang dapat membantu untuk anallisa lebih lanjut
- Sebelumnya dilakukan stopword removal yaitu penghapusan kata-kata yang sering muncul namun tidak begitu bernilai untuk analisa teks

Wordcloud Visualization

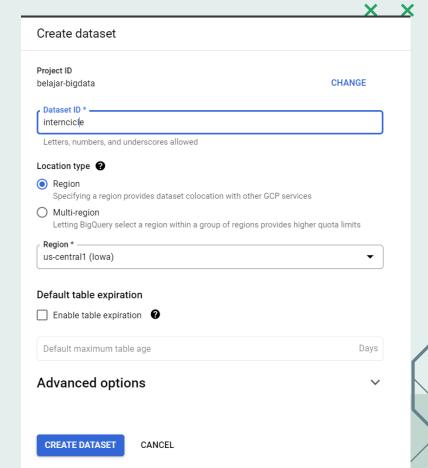






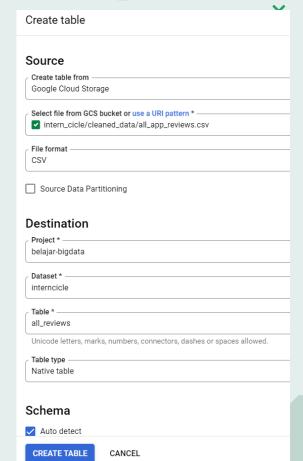
Load Data Cloud Storage ke BigQuery× ×

- Klik tanda i di sebelah kanan project dan klik create dataset jika belum ada
- Klik tanda i di sebelah kanan dataset dan klik create table jika belum ada

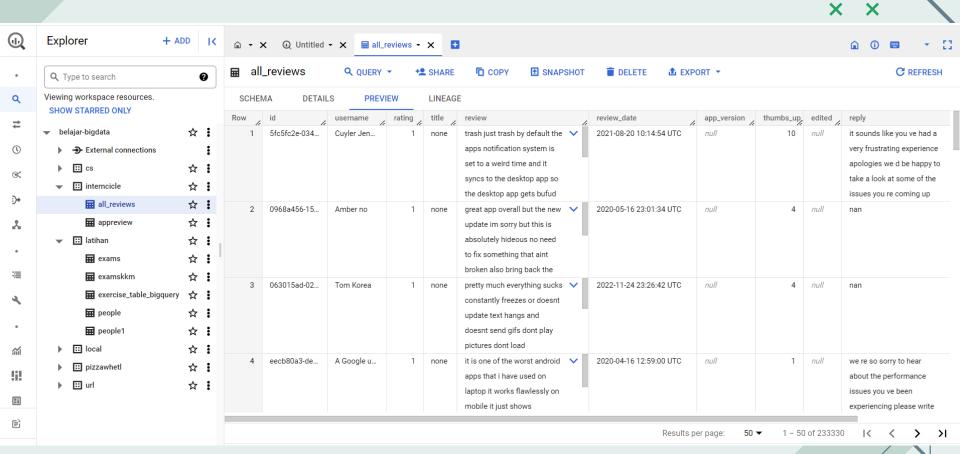


Load Data Cloud Storage ke BigQuery× ×

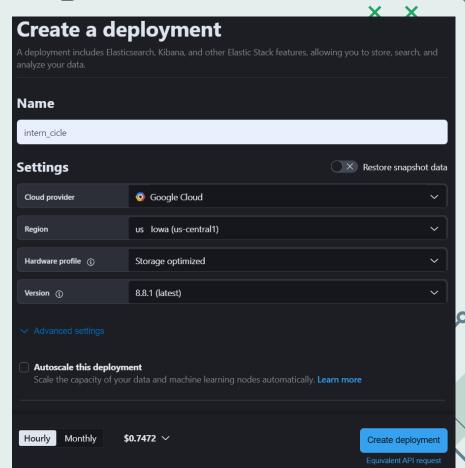
- Klik tanda i di sebelah kanan project dan klik create dataset jika belum ada
- Klik tanda i di sebelah kanan dataset dan klik create table jika belum ada



Load Data Cloud Storage ke BigQuery×

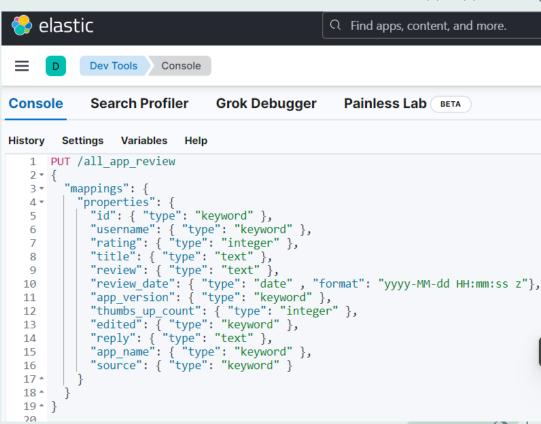


- Buat cluster elastic cloud baru jika belum ada
- Buat index baru untuk menampung data review jika belum ada
- Generate API key untuk mengakses index tersebut jika belum ada
- Buat job di dataflow menggunakan template bigquery to elasticsearch



X

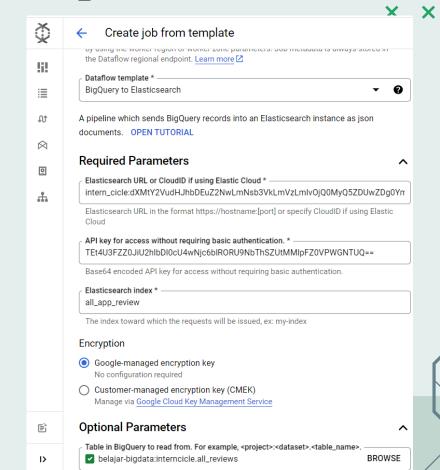
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```
API console
Perform operations-related tasks from this console. You can run search queries, review
  POST ∨
                / security/api key
          "name": "my-api-key",
          'expiration": "1d".
          'role descriptors": {
            "cluster": ["all"],
                "names": ["all app review"],
                "privileges": ["all"]
  200 — OK (917 ms)
      "api key": "nTNEOMm8ReKL2ZEgEOXcSQ",
     "expiration": 1686554317756,
     "id": "LKxSqYqBbShel9tqN067",
      "encoded": "TEt4U3FZZ0JiU2hlbDl0cU4wNjc6blRORU9NbThSZUtMMlpFZ0VPWGNTUQ==",
      "name": "my-api-key"
```

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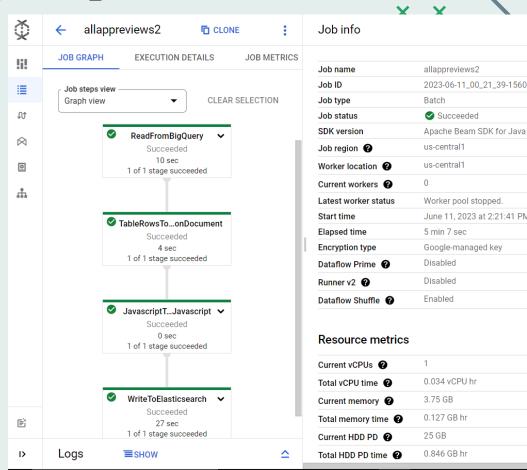


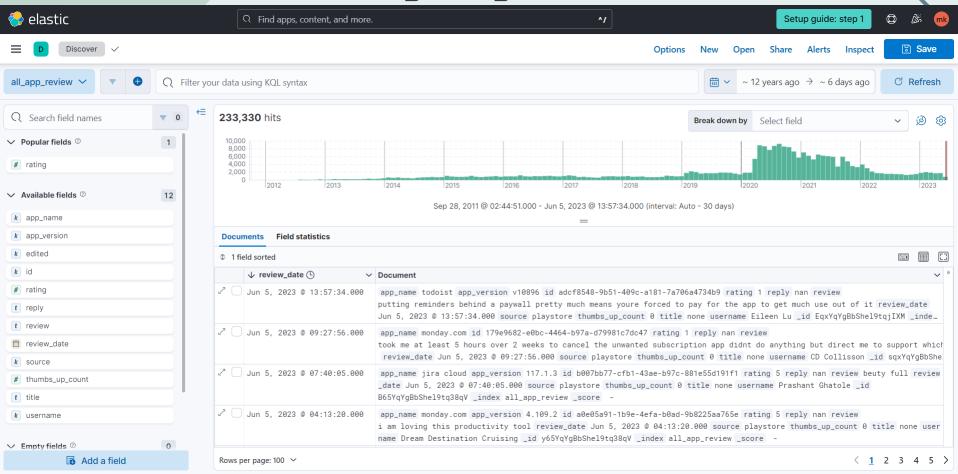
Langkah-Langkah:

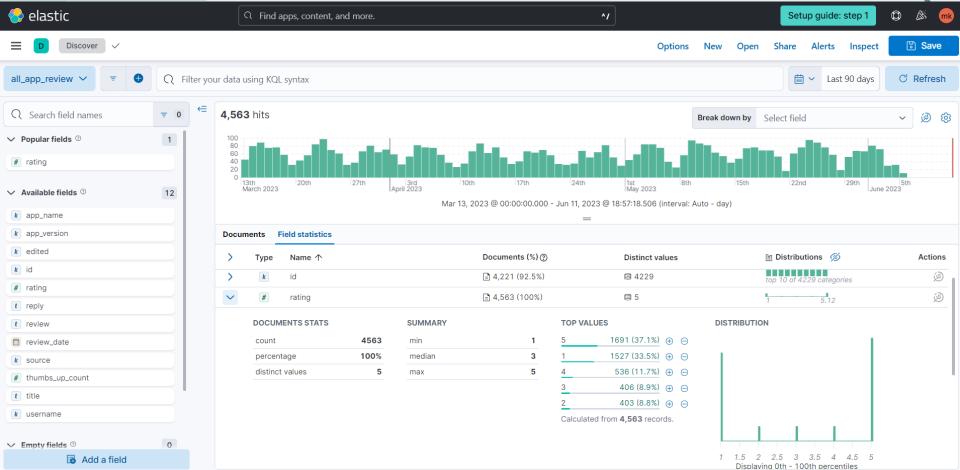
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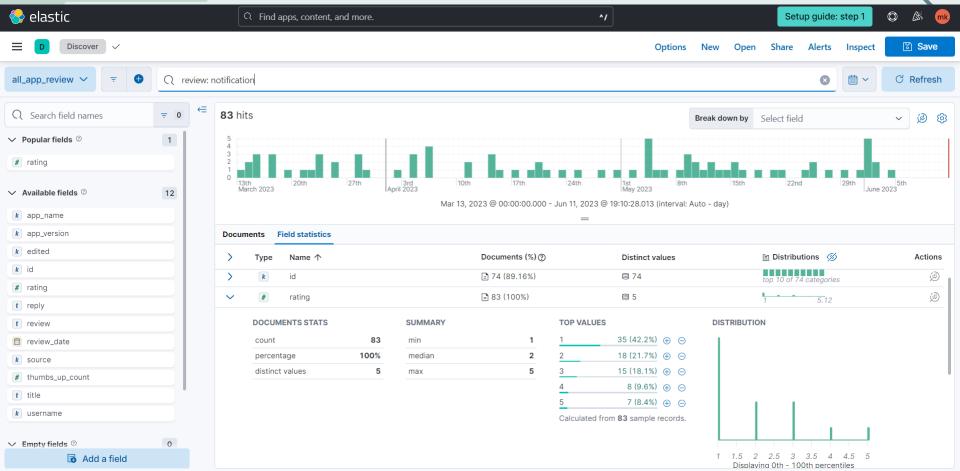
gcloud dataflow flex-template run allappreviews2 --template-file-gcs-location
gs://dataflow-templates-us-central1/latest/flex/BigQuery_to_Elasticsearch --region uscentral1 --parameters inputTableSpec=belajarbigdata:interncicle.all_reviews,connectionUrl=intern_cicle:dXMtY2VudHJhbDEuZ2NwLmNsb3V
kLmVzLmlvOjQ0MyQ5ZDUwZDg0YmY5OTk0MzYyYjI1Y2NmNGY4ZmJkMjVkZSRkZTIzYzEwNjQyZTA0MTI5YTQ50
DFkY2RjZjMwZDA1MA==,apiKey=TEt4U3FZZ0JiU2hlbDl0cU4wNjc6blRORU9NbThSZUtMMlpFZ0VPWGNTUQ=
=,index=all_app_review,maxRetryAttempts=2,maxRetryDuration=300000

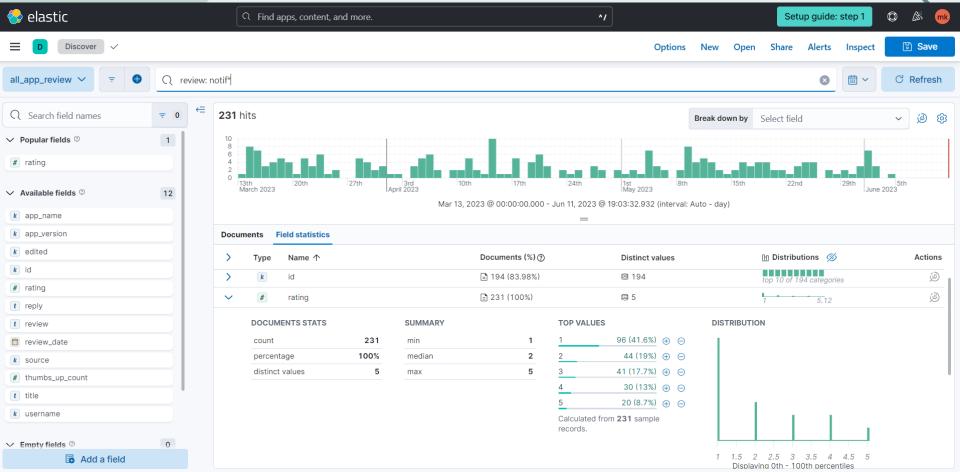
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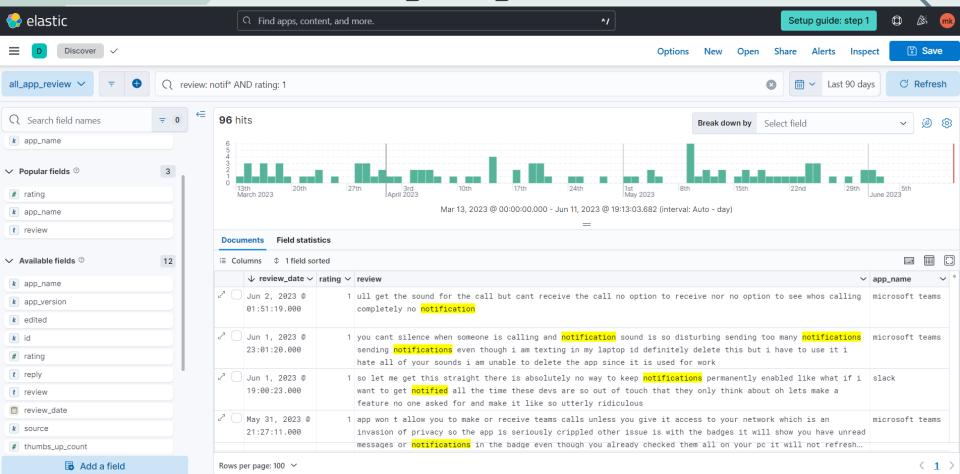






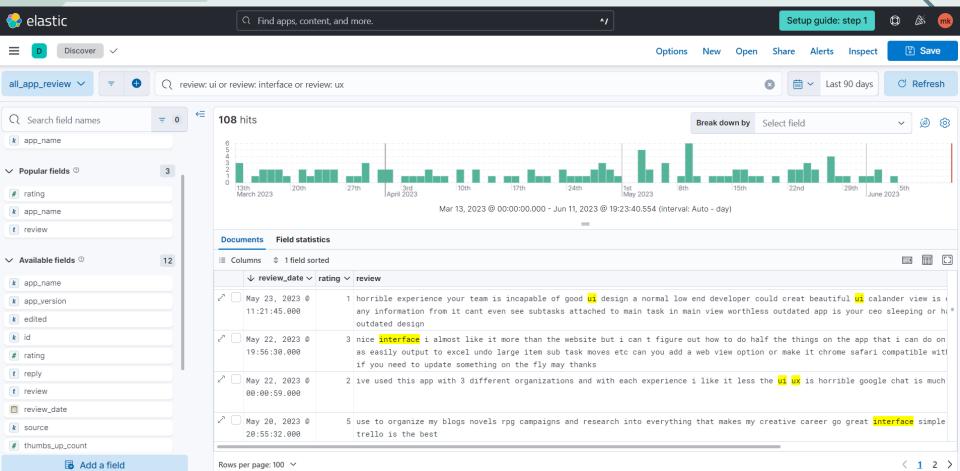


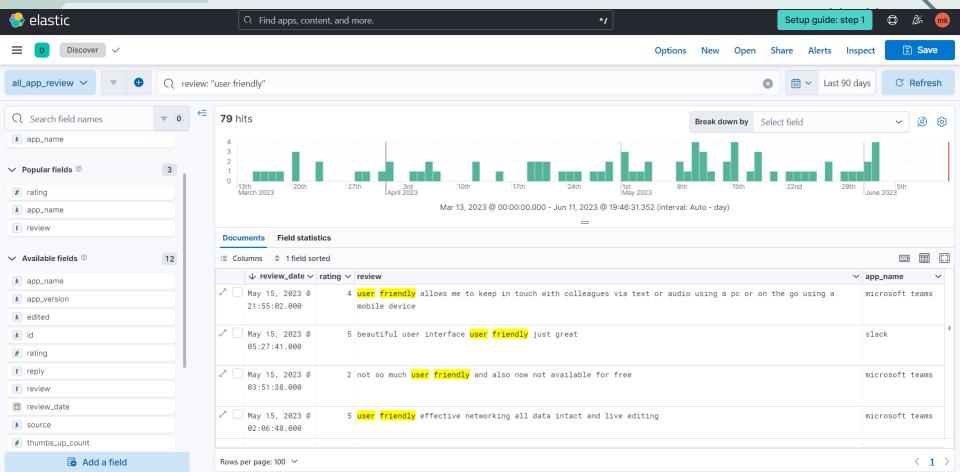


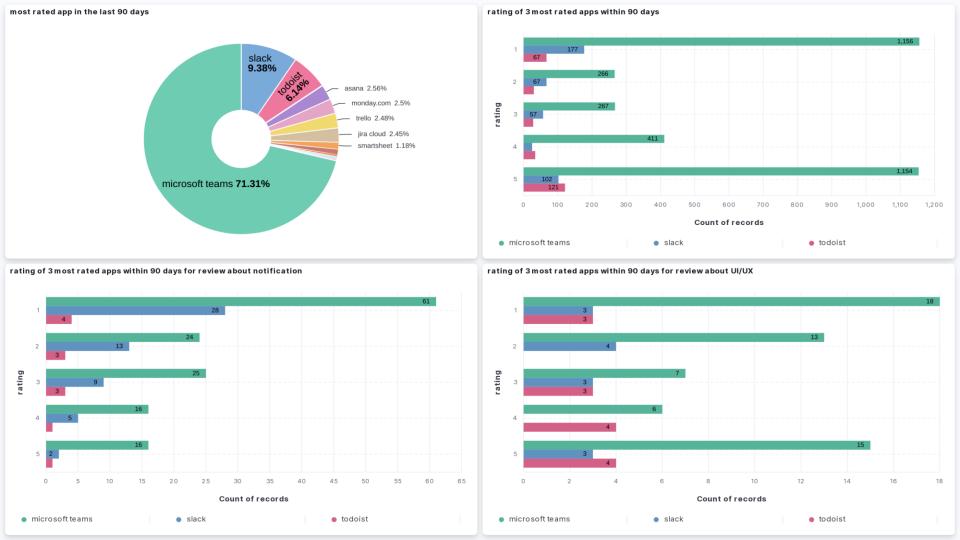


i≣ Columns	d sorted			4
↓ review_date	√ rating √	review	app_name	~
✓		i once installed on a different phone which got broken down and currently using a different phone infinix note 8i but unable to download since i got notified it has been downloaded on unseful phone	microsoft team	S
√ May 17, 2023 02:41:43.000		please fix this i need to be able to turn on notifications for particular threads the option is now missing from the mobile app edit also having two accounts makes it slow and buggy and i do not think my s23 ultra is at fault here	microsoft team	S
✓ May 16, 2023 17:46:52.000		the files are not opening app keeps crashing a lot recently and also no <mark>notifications</mark> are showing up	microsoft team	S
√ May 16, 2023 01:17:44.000		srill an alpha release no big fixes and barely works can i drop to zero stars so bad developer has a fundamental misunderstanding of how mobile apps work back is back not to the last fragment app crashes constantly viewing images is problematic notifications are iffy adding a device to a call crashes the app completely logs you out regularly very amateur app only use it because i have to	microsoft team	5
May 15, 2023 08:05:29.000		1 star for mobile app its not consistent today the message send button is disappeared if you cant send message then whats point of this app message notification is not functioning correctly loading of messages is very slow	slack	
May 13, 2023 05:51:40.000		as expected microsoft products degrade in quality with time in the latest change common actions are removed or made undiscoverable getting all types of notifications and theres no way to mute a channel	microsoft team	S
May 13, 2023 03:58:18.000		recent update messes up notification messages quit installing this app automatically in windows and reinstalling without permission clicking on a emoticon in a message does not show tomhe users who have liked it and now add a like horrible option with no noticr before adding	microsoft team	S
May 12, 2023 22:26:24.000		doesnt show notifications on time it takes 3 business days for it to show the notification in the notifications shade ive got into trouble because of this	slack	
✓		on iphone the only option is to turn on notifications gee thanks i already get fuxkinh notifications for every message on the thread however when i m not interested in continuing the dialog or it s out of my control i should be able to turn off notifications for that thread not on teams though only option is on when you re on mobile 1 5 do not recommend use slack instead	microsoft team	S
May 11, 2023 04:49:27.000		used to be fine now it notifies me for every message i get even when im active on desktop which is supposed to block them of course i cant turn off the notifications though because i need them to be on for the instances where the desktop application randomly decides not to notify me on the windows pc its running on pretty crazy how this app can run better on android than the desktop app runs on microsofts own operating system 1 star anyways microsoft you suck	microsoft team	5
D 100			/ 4	,

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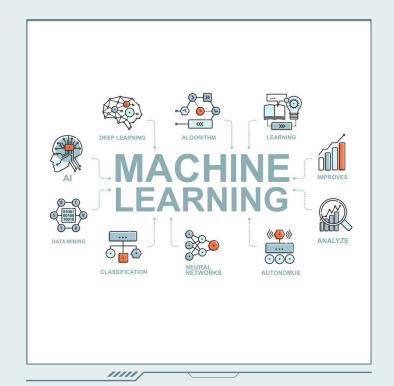


+Analisa Lebih Mendalam dengan Machine Learning

Ada beberapa teknik machine learning yang dapat digunakan untuk mengklasifikasi data teks:

- Intent classification
- Urgency detection
- Topic classification

dengan memberikan label hasil klasifikasi pada data, kita dapat mengeksplorasi data lebih baik dengan elasticsearch





Contoh Klasifikasi

•			
review	intent	urgency	topic
I love the interface, but it would be better if we could have an option to customize the color scheme	feature request	low	UI/UX
Error when trying to download data from google drive. Please fix it I need them ASAP	bug report	high	integration
Notif works flawlessly. It's really helpful to receive timely updates on my account activity.	positive feedback	low	notification
cs is so fast response. You deserve 5 stars	positive feedback	low	customer service
Love this app thank you dev!	positive feedback	low	general



Estimasi Budget Bulanan

BigQuery General Compute Engine ΙŒ all reviews 1 x running python script for webscraping and data preprocessing Location: Iowa Active Logical Storage: 0.098 GiB USD 0.00 Region: Iowa Active Physical Storage: 0.024 GiB USD 0.00 2 total hours per month USD 0.00 Provisioning model: Regular Instance type: n1-standard-1 USD 0.09 Operating System / Software: Free 1 x n1-standard-1 workers in Batch Mode Estimated Component Cost: USD 0.09 per 1 month Region: Iowa Cloud Storage Total vCPU Hours: 1 Total Memory Hours: 3.75 GiB/Hours 1x Standard Storage PD Local Storage: 100 GiB/hours Location: Iowa USD 0.07 Total Amount of Storage: 0.098 GiB USD 0.00 Total Estimated Cost: USD 0.17 per 1 month Always Free usage included: No Estimate Currency

USD - US Dollar

USD 0.00

Budget GCP:

\$0.17 = Rp2531,12

Jika analisa dilakukan sebulan sekali

Estimasi Budget Bulanan

Budget Elastic Cloud:

5 hari x 6 jam x\$0,3141 = \$9,423 = Rp140.298,58

Total Estimasi:

Rp140.298,58 + Rp2531,12 = Rp142.829,7



Summary

andard	Gold	Platinum	Enterprise					

ELASTICSEARCH

Hot storage 180 GB
Hot memory 4 GB
Master node ② 1 GB

Hourly rate \$0.1505

KIBANA

Memory **4 GB** Hourly rate **\$0.1636**

APM

Memory 1 GB Hourly rate free

INTEGRATIONS SERVER

Memory 1 GB Hourly rate free

ENTERPRISE SEARCH

Memory 2 GB Hourly rate free

TOTAL

Hourly rate

Total storage 180 GB
Total memory 13 GB

* Data transfer and snapshot storage fees may apply.

\$0.3141

