UTS Text Mining

Nama - Kelas - NIM : Nicholas Javier - LA05 - 2502041956

Video Penjelasan: https://youtu.be/Z1spbXNlIXA

Backup Video: https://youtu.be/Z1spbXNlIXA

```
!pip install newspaper3k

Collecting newspaper3k
  Downloading newspaper3k-0.2.8-py3-none-any.whl (211 kB)
━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 211.1/211.1 kB 2.9 MB/s eta
0:00:00
ent already satisfied: beautifulsoup4>=4.4.1 in
/usr/local/lib/python3.10/dist-packages (from newspaper3k) (4.12.3)
Requirement already satisfied: Pillow>=3.3.0 in
/usr/local/lib/python3.10/dist-packages (from newspaper3k) (9.4.0)
Requirement already satisfied: PyYAML>=3.11 in
/usr/local/lib/python3.10/dist-packages (from newspaper3k) (6.0.1)
Collecting cssselect>=0.9.2 (from newspaper3k)
  Downloading cssselect-1.2.0-py2.py3-none-any.whl (18 kB)
Requirement already satisfied: lxml>=3.6.0 in
/usr/local/lib/python3.10/dist-packages (from newspaper3k) (4.9.4)
Requirement already satisfied: nltk>=3.2.1 in
/usr/local/lib/python3.10/dist-packages (from newspaper3k) (3.8.1)
Requirement already satisfied: requests>=2.10.0 in
/usr/local/lib/python3.10/dist-packages (from newspaper3k) (2.31.0)
Collecting feedparser>=5.2.1 (from newspaper3k)
  Downloading feedparser-6.0.11-py3-none-any.whl (81 kB)
━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 81.3/81.3 kB 10.7 MB/s eta
0:00:00
 newspaper3k)
  Downloading tldextract-5.1.2-py3-none-any.whl (97 kB)
━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 97.6/97.6 kB 8.5 MB/s eta
0:00:00
 newspaper3k)
  Downloading feedfinder2-0.0.4.tar.gz (3.3 kB)
  Preparing metadata (setup.py) ...  newspaper3k)
  Downloading jieba3k-0.35.1.zip (7.4 MB)
```

```
━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 7.4/7.4 MB 73.2 MB/s eta
0:00:00
etadata (setup.py) ... ent already satisfied: python-dateutil>=2.5.3
in /usr/local/lib/python3.10/dist-packages (from newspaper3k) (2.8.2)
Collecting tinysegmenter==0.3 (from newspaper3k)
  Downloading tinysegmenter-0.3.tar.gz (16 kB)
  Preparing metadata (setup.py) ... ent already satisfied:
soupsieve>1.2 in /usr/local/lib/python3.10/dist-packages (from
beautifulsoup4>=4.4.1->newspaper3k) (2.5)
Requirement already satisfied: six in /usr/local/lib/python3.10/dist-
packages (from feedfinder2>=0.0.4->newspaper3k) (1.16.0)
Collecting sgmllib3k (from feedparser>=5.2.1->newspaper3k)
  Downloading sgmllib3k-1.0.0.tar.gz (5.8 kB)
  Preparing metadata (setup.py) ... ent already satisfied: click in
/usr/local/lib/python3.10/dist-packages (from nltk>=3.2.1-
>newspaper3k) (8.1.7)
Requirement already satisfied: joblib in
/usr/local/lib/python3.10/dist-packages (from nltk>=3.2.1-
>newspaper3k) (1.4.0)
Requirement already satisfied: regex>=2021.8.3 in
/usr/local/lib/python3.10/dist-packages (from nltk>=3.2.1-
>newspaper3k) (2023.12.25)
Requirement already satisfied: tqdm in /usr/local/lib/python3.10/dist-
packages (from nltk>=3.2.1->newspaper3k) (4.66.2)
Requirement already satisfied: charset-normalizer<4,>=2 in
/usr/local/lib/python3.10/dist-packages (from requests>=2.10.0-
>newspaper3k) (3.3.2)
Requirement already satisfied: idna<4,>=2.5 in
/usr/local/lib/python3.10/dist-packages (from requests>=2.10.0-
>newspaper3k) (3.7)
Requirement already satisfied: urllib3<3,>=1.21.1 in
/usr/local/lib/python3.10/dist-packages (from requests>=2.10.0-
>newspaper3k) (2.0.7)
Requirement already satisfied: certifi>=2017.4.17 in
/usr/local/lib/python3.10/dist-packages (from requests>=2.10.0-
>newspaper3k) (2024.2.2)
Collecting requests-file>=1.4 (from tldextract>=2.0.1->newspaper3k)
  Downloading requests_file-2.0.0-py2.py3-none-any.whl (4.2 kB)
Requirement already satisfied: filelock>=3.0.8 in
/usr/local/lib/python3.10/dist-packages (from tldextract>=2.0.1-
>newspaper3k) (3.13.4)
Building wheels for collected packages: tinysegmenter, feedfinder2,
jieba3k, sgmllib3k
  Building wheel for tinysegmenter (setup.py) ... enter:
filename=tinysegmenter-0.3-py3-none-any.whl size=13538
sha256=65abc596ed85aa27aac3a62bc69ba8879db457f30ac70daf19bd09e05fa8d02
9
  Stored in directory:
/root/.cache/pip/wheels/c8/d6/6c/384f58df48c00b9a31d638005143b5b3ac62c
```

```
3d25fb1447f23
  Building wheel for feedfinder2 (setup.py) ... e=feedfinder2-0.0.4-
py3-none-any.whl size=3340
sha256=9e958a31a2bed028a0584d4ed84f00b2384ed0326a03a58f162cef0ede488d4
c
  Stored in directory:
/root/.cache/pip/wheels/97/02/e7/a1ff1760e12bdbaab0ac824fae5c1bc933e41
c4ccd6a8f8edb
  Building wheel for jieba3k (setup.py) ... e=jieba3k-0.35.1-py3-none-
any.whl size=7398382
sha256=910c691f3fef03c3e7f6985a6c72d38ec553b641b54aae0d2ff2964b61ea7e2
1
  Stored in directory:
/root/.cache/pip/wheels/7a/c4/0c/12a9a314ecac499456c4c3b2fcc2f635a3b45
a39dfbd240299
  Building wheel for sgmllib3k (setup.py) ... llib3k:
filename=sgmllib3k-1.0.0-py3-none-any.whl size=6049
sha256=2c27197c486b80e25f012a4d3af40b2890d1b93de0b568c983543c12a954e6d
2
  Stored in directory:
/root/.cache/pip/wheels/f0/69/93/a47e9d621be168e9e33c7ce60524393c0b92a
e83cf6c6e89c5
Successfully built tinysegmenter feedfinder2 jieba3k sgmllib3k
Installing collected packages: tinysegmenter, sgmllib3k, jieba3k,
feedparser, cssselect, requests-file, feedfinder2, tldextract,
newspaper3k
Successfully installed cssselect-1.2.0 feedfinder2-0.0.4 feedparser-
6.0.11 jieba3k-0.35.1 newspaper3k-0.2.8 requests-file-2.0.0 sgmllib3k-
1.0.0 tinysegmenter-0.3 tldextract-5.1.2
```

Pertama-tama kita langsung melakukan !pip install newspaper3k untuk mendapatkan berita dan artikel yang di website online. DIgunakan untuk scrapping dan digunakan untuk menerima beberapa tulisan informasi yang penting dari berita tersebut

1. Scrapping

```
import newspaper
from newspaper import build
import pandas as pd

sources = [
    ('https://news.kompas.com/', 'politik'), #Kompas Politik
    ('https://www.antaranews.com/politik', 'politik'), # Antarnews
Politik
    ('https://pemilu.tempo.co/','politik'), # Tempo Politik
    ('https://sports.okezone.com/', 'olahraga'),# Okezone Politik
    ('https://bola.kompas.com/', 'olahraga'),# Olahraga Kompas
    ('https://www.metrotvnews.com/channel/olahraga', 'olahraga'),  #
Metro Olahraga
```

```
    ('https://money.kompas.com/', 'bisnis'), # Kompas Bisnis
    ('https://www.cnbcindonesia.com/', 'bisnis'),

('https://www.suara.com/entertainment/entertainment-category/gosip',
'hiburan'),
    ('https://entertainment.kompas.com/', 'hiburan') # Kompas
Entertainment
]

def scrape_articles(sources, count):
    articles = []
    for url, category in sources:
        paper = build(url, memoize_articles=False, language='id')
        counter = 0
        for article in paper.articles[1:count + 1]:
            try:
                article.download()
                article.parse()
                articles.append({
                    'text': article.text,
                    'media': paper.brand,
                    'label': category
                })
                counter += 1
            except Exception as e:
                print('Not Found')
    return articles

newscraper = scrape_articles(sources, 12)
df = pd.DataFrame(newscraper)
print(df)
```

```
CRITICAL:newspaper.network:[REQUEST FAILED] 404 Client Error: Not
Found for url: https://news.kompas.com/rss
CRITICAL:newspaper.network:[REQUEST FAILED] 404 Client Error: Not
Found for url: https://news.kompas.com/feed
CRITICAL:newspaper.network:[REQUEST FAILED] 404 Client Error: Not
Found for url: https://news.kompas.com/feeds
CRITICAL:newspaper.network:[REQUEST FAILED] 404 Client Error: Not
Found for url: https://www.antaranews.com/feeds
CRITICAL:newspaper.network:[REQUEST FAILED]
HTTPSConnectionPool(host='korporat.tempo.co', port=443): Max retries
exceeded with url: / (Caused by
ConnectTimeoutError(<urllib3.connection.HTTPSConnection object at
0x78c96dc8e860>, 'Connection to korporat.tempo.co timed out. (connect
timeout=7)'))
WARNING:newspaper.source:Deleting category https://korporat.tempo.co
from source https://pemilu.tempo.co/ due to download error
CRITICAL:newspaper.network:[REQUEST FAILED] 404 Client Error: Not
Found for url: https://pemilu.tempo.co/feeds
```

```
CRITICAL:newspaper.network:[REQUEST FAILED] 404 Client Error: Not
Found for url: https://pemilu.tempo.co/feed
CRITICAL:newspaper.network:[REQUEST FAILED] 404 Client Error: Not
Found for url: https://pemilu.tempo.co/rss
CRITICAL:newspaper.network:[REQUEST FAILED] 500 Server Error: Internal
Server Error for url: https://sports.okezone.com/rss
CRITICAL:newspaper.network:[REQUEST FAILED] 404 Client Error: Not
Found for url: https://sports.okezone.com/feeds
CRITICAL:newspaper.network:[REQUEST FAILED] 500 Server Error: Internal
Server Error for url: https://sports.okezone.com/feed
CRITICAL:newspaper.network:[REQUEST FAILED] 404 Client Error: Not
Found for url: https://bola.kompas.com/feeds
CRITICAL:newspaper.network:[REQUEST FAILED] 404 Client Error: Not
Found for url: https://bola.kompas.com/rss
CRITICAL:newspaper.network:[REQUEST FAILED] 404 Client Error: Not
Found for url: https://bola.kompas.com/feed
CRITICAL:newspaper.network:[REQUEST FAILED] 404 Client Error: Not
Found for url: https://money.kompas.com/feeds
CRITICAL:newspaper.network:[REQUEST FAILED] 404 Client Error: Not
Found for url: https://money.kompas.com/rss
CRITICAL:newspaper.network:[REQUEST FAILED] 404 Client Error: Not
Found for url: https://money.kompas.com/feed
CRITICAL:newspaper.network:[REQUEST FAILED] 404 Client Error: Not
Found for url: https://www.cnbcindonesia.com/feed
CRITICAL:newspaper.network:[REQUEST FAILED] 404 Client Error: Not
Found for url: https://www.cnbcindonesia.com/feeds
CRITICAL:newspaper.network:[REQUEST FAILED] 404 Client Error: Not
Found for url: https://www.suara.com/404
CRITICAL:newspaper.network:[REQUEST FAILED] 404 Client Error: Not
Found for url: https://www.suara.com/404
CRITICAL:newspaper.network:[REQUEST FAILED] 404 Client Error: Not
Found for url: https://entertainment.kompas.com/feeds
CRITICAL:newspaper.network:[REQUEST FAILED] 404 Client Error: Not
Found for url: https://entertainment.kompas.com/rss
CRITICAL:newspaper.network:[REQUEST FAILED] 404 Client Error: Not
Found for url: https://entertainment.kompas.com/feed

                                                  text   media
label
0    JAKARTA, KOMPAS.com - Pemilihan Kepala Daerah ...  kompas
politik
1    JAKARTA, KOMPAS.com - Polisi masih memeriksa k...  kompas
politik
2    JAKARTA, KOMPAS.com - Agusmita (27) kini menja...  kompas
politik
3    \n\nJAKARTA, KOMPAS.com - Jajaran Satuan Reser...  kompas
politik
4    \n\nYOGYAKARTA, KOMPAS.com - Muhammadiyah meng...  kompas
politik
..                                                 ...     ...      ..
```

```
.
115  KOMPAS.com - Penggemar anime sangat menantikan...  kompas
hiburan
116  JAKARTA, KOMPAS.com - Komedi Kacau merupakan s...  kompas
hiburan
117  JAKARTA, KOMPAS.com - Reclaim merupakan sebuah...  kompas
hiburan
118  JAKARTA, KOMPAS.com - Film action thriller Tor...  kompas
hiburan
119  JAKARTA, KOMPAS.com - Catheez merupakan gamer ...  kompas
hiburan

[120 rows x 3 columns]
```

Cell code diatas merupakan bagian dari scrapping dimana saya awalnya memasukan beberapa URL atau link yang saya simpan di variable sources. Setelah itu di download, di parse, mengambil tulisan dengan adanya context. Setelah itu saya mengambil dari media, category, dan isi dari teksnya. Kemudian saya simpas di dataframe dan kemudian di print.

```
df.to_csv('UTS_CSV.csv',index = False)
```

Saya menyimpan dataframe yang tadi kedalam UTS_CSV.csv

```
df
```


```
{"summary":"{\n  \"name\": \"df\",\n  \"rows\": 120,\n  \"fields\": [\
n    {\n      \"column\": \"text\",\n      \"properties\": {\n
\"dtype\": \"string\",\n        \"num_unique_values\": 116,\n
\"samples\": [\n          \"Jakarta, CNBC Indonesia - Sebelum Anda
memutuskan untuk membeli rumah, ada beberapa pertimbangan finansial
yang penting untuk dipertimbangkan. Ramit Sethi, yang dikenal sebagai
bintang Netflix dan penulis buku \\\"I Will Teach You To Be Rich,\\\"
menawarkan lima pertanyaan kunci yang dapat membantu Anda membuat
keputusan yang lebih bijak secara finansial dalam proses pembelian
rumah pertama Anda.\\n\\nDalam sebuah posting di akun Instagramnya,
Sethi menekankan pentingnya memiliki alasan yang jelas untuk membeli
rumah. Hal ini karena rumah, sebagai sebuah aset, bukanlah sesuatu
yang murah harganya.\\n\\nBanyak orang yang memerlukan pembiayaan dari
bank atau lembaga keuangan lainnya untuk mewujudkan impian memiliki
rumah. Sebelum Anda membeli rumah, ada baiknya Anda dapat menjawab
pertanyaan-pertanyaan berikut:\\n\\nADVERTISEMENT SCROLL TO RESUME
CONTENT\\n\\nApakah Anda berencana tinggal di sana lebih dari 10
tahun?\\n\\nMemiliki rumah yang jauh dari tempat kerja atau tempat
lain yang sering Anda kunjungi dapat menjadi beban tambahan. Rumah
yang tidak ditempati dengan baik memiliki risiko kerusakan yang lebih
tinggi, yang dapat mengakibatkan biaya perbaikan yang besar.\\n\\
nApakah pengeluaran operasional rumah gak melebihi 28% dari pemasukan
bulanan Anda?\\n\\nJika tagihan-tagihan seperti listrik, air,
keamanan, dan iuran komplek sudah melebihi 28% dari pemasukan bulanan
```

Anda, bagaimana Anda akan memenuhi kebutuhan sehari-hari dan mengelola cicilan kredit?\\n\\nApakah Anda punya uang setara dengan 20% dari harga rumah untuk bayar dp?\\n\\nUang muka rumah biasanya sekitar 20% dari harga rumah, ditambah dengan cicilan pertama dan biaya-biaya lainnya. Pastikan Anda telah mempersiapkan dana yang cukup untuk hal ini.\\n\\nBagaimana jika harga rumah turun?\\n\\nInvestasi properti memiliki risiko harga turun. Jika Anda membeli rumah sebagai investasi, Anda harus siap menghadapi risiko-risiko tersebut.\\n\\nApakah Anda merasa senang dengan keputusan membeli rumah ini?\\n\\nJangan abaikan dampak emosional dari keputusan finansial Anda. Jika pembelian rumah membuat Anda stres atau merasa terbebani secara finansial, mungkin belum saatnya bagi Anda untuk membeli rumah.\\n\\nKeputusan untuk membeli rumah adalah hal yang serius dan memerlukan pertimbangan matang. Pastikan Anda telah memperhitungkan dengan baik semua aspek keuangan dan emosional sebelum membuat keputusan akhir.\",\n   \"\\n\\nYOGYAKARTA, KOMPAS.com - Muhammadiyah menghargai sikap kenegarawanan pasangan Anies Basewedan-Muhaimin Iskandar dan Ganjar Pranowo-Mahfud MD terkait putusan Mahkamah Konstitusi (MK) soal sengketa hasil Pemilu 2024.\\n\\nHal tersebut disampaikan oleh Ketua Umum Pimpinan Pusat Muhammadiyah Haedar Nashir.\\n\\n\\\"Kita menghargai sikap kenegarawanan keempat tokoh, Pak Ganjar, Anies, Mahfud, Muhaimin sekaligus juga memberi harapan bagi masa depan bangsa bersama tokoh-tokoh lain untuk bersama-sama membangun Indonesia,\\\" ujar Haedar, saat ditemui di Fisipol UGM, Selasa (23/4/2024).\\n\\nHaedar menyampaikan kepada Prabowo Sunianto dan Gibran Rakabuming Raka yang memperoleh mandat juga harus menyerap aspirasi dari Anies Baswedan-Muhaimin Iskandar dan Ganjar Pranowo-Mahfud MD.\\n\\nBaca juga: Jokowi: Pemerintah Hormati Putusan MK yang Tolak Gugatan Sengketa Pilpres\\n\\n\\\"Pada yang memperoleh mandat yakni Pak Prabowo tentu juga harus menyerap aspirasi dari ke empat tokoh tadi yang juga menjadi sebuah pertanggungjawaban politik dan konstitusi yang besar dan berat,\\\" tutur dia.\\n\\nIndonesia ke depan, lanjut Haedar, harus menata seluruh problem dari berbagai aspek.\\n\\nKemudian, membangun Indonesia berbasis kepada Pancasila. Agar Pancasila itu tidak hanya sebagai sesuatu yang normatif.\\n\\nSelain itu, juga membawa kemajuan setara dengan bangsa lain.\\n\\n\\\"Jadi, kita tidak boleh merasa berada dalam fase yang sudah maju. Kita ini masih tertinggal dari berbagai aspek yang memerlukan strong leadership tapi sekaligus juga leadership yang memiliki hikmah kebijaksanaan dan kecerdasan tinggi,\\\" ucap dia.\\n\\nHaedar mengungkapkan, pasca Pemilu 2024 semua komponen bangsa harus bersatu dalam keragaman orientasi politik.\\n\\nBaca juga: Jelang Putusan MK, 800 Personel Polisi Jaga KPU dan Bawaslu Sulsel\\n\\nSemua komponen bangsa harus mulai membangun semangat bersatu dan jangan sampai larut dalam situasi politik yang kemudian membuat perpecahan.\\n\\n\\\"Sekali lagi seluruh pihak termasuk partai politik, nanti juga eksekutif, legislatif yudikatif harus belajar dari kekurangan kelemahan dan problem yang selama ini dihadapi bahwa Indonesia itu memiliki masalah, karena jangan-jangan kita sendiri memang untuk

```
menciptakan masalah itu,\\\" pungkas dia.\",\n          \"JADWAL
lengkap tim bulu tangkis Indonesia di Piala Thomas dan Uber 2024 akan
dibahas Okezone. Seluruh pertandingan akan disiarkan secara ekslusif
di iNews TV.\\n\\nGelaran Piala Thomas dan Uber 2024 akan berlangsung
di Chengdu, China. Turnamen akan berlangsung pada 28 April-5 Mei
2024.\\n\\nPada ajang Piala Thomas 2024, Tim Bulu Tangkis Indonesia
tergabung di Grup C. Tim Merah-Putih berada satu grup dengan Thailand,
Inggris dan juara bertahan India.\\n\\nMelihat dari calon lawan,
persaingan di Grup C akan berlangsung ketat. Keempat negara penghuni
Grup C cukup berimbang untuk bersaing melaju ke babak berikutnya.\\n\\
nTim bulu tangkis Indonesia akan menghadapi Inggris di laga pembuka.
Pertandingan akan digelar pada Sabtu 27 April 2024.\\n\\nFollow Berita
Okezone di Google News\\n\\nDapatkan berita up to date dengan semua
berita terkini dari Okezone hanya dengan satu akun di ORION, daftar
sekarang dengan klik disini dan nantikan kejutan menarik lainnya\\n\\
nBeralih ke Piala Uber 2024, Srikandi Merah-Putih tergabung di C.
Berbeda dengan tim putra, tim bulu tangkis putri Indonesia cenderung
tidak menghadapi banyak lawan berat di fase grup. Indonesia tergabung
di Grup C bersama Jepang, Hong Kong dan Uganda. Melihat kekuatan dari
tiap negara, Indonesia seharusnya bisa lolos bersama Jepang ke babak
berikutnya. BACA JUGA: Piala Thomas 2024: Alwi Farhan Sudah Punya
Gambaran jika Diturunkan di Partai Penentuan Berikut Jadwal Lengkap
Indonesia di Thomas dan Uber Cup 2024: Piala Thomas Sabtu, 27 April
2024, pukul 18.00 WIB Indonesia vs Inggris Senin, 29 April 2024, pukul
9.30 WIB Indonesia vs Thailand Rabu, 1 Mei 2024 pukul 17.00 WIB
Indonesia vs India Piala Uber Sabtu, 27 April 2024, pukul 13.00 WIB
Indonesia vs Hong Kong Senin, 29 April 2024 pukul 17.00 WIB Indonesia
vs Uganda Rabu, 1 Mei 2024 pukul 9.30 WIB Indonesia vs Jepang
Perempatfinal Kamis, 2 Mei 2024 Pukul 9.30 WIB, perempatfinal Uber
Pukul 17.00 WIB, perempatfinal Thomas Jumat, 3 Mei 2024 Pukul 9.30
WIB, perempatfinal Uber Pukul 17.00 WIB, perempatfinal Thomas
Semifinal Sabtu, 4 Mei 2024 Pukul 9.30 WIB, semifinal Uber Pukul 17.00
WIB, semifinal Thomas Final Minggu, 5 Mei 2024 Pukul 9.30 WIB, Uber
Cup Final Pukul 17.00 WIB, Thomas Cup Final\"\n        ],\n
\"semantic_type\": \"\",\n        \"description\": \"\"\n      }\
n    },\n    {\n      \"column\": \"media\",\n      \"properties\": {\
n        \"dtype\": \"category\",\n        \"num_unique_values\": 7,\n
\"samples\": [\n          \"kompas\",\n          \"antaranews\",\n
\"cnbcindonesia\"\n        ],\n        \"semantic_type\": \"\",\n
\"description\": \"\"\n      }\n    },\n    {\n      \"column\":
\"label\",\n      \"properties\": {\n        \"dtype\": \"category\",\
n        \"num_unique_values\": 4,\n        \"samples\": [\n
\"olahraga\",\n          \"hiburan\",\n          \"politik\"\
n        ],\n        \"semantic_type\": \"\",\n
\"description\": \"\"\n      }\n    }\n  ]\
n}","type":"dataframe","variable_name":"df"}
```


Saya hanya mengeprint lagi untuk memeriksa apakah ada yang duplikat atau isi teks, media, category sudah bener.

##2. Melakukan text preprocessing seperti cleansing, tokenization, filtering dan anda dapat menambahkan stemming atau lemmatization jika diperlukan. Sediakan hasil cleansing dalam 1 kolom terpisah sehingga anda memiliki table sebagai berikut:

Berikutnya yang saya lakukan adalah bagian preprocessing

```
df = pd.read_csv('UTS_CSV.csv')
```

Agar sudah tidak perlu run yang atas karena di runnya cukup lama. Saya hanya perlu mengimpor UTS_CSV.csv agar tidak perlu run lagi

```
df.head(5)
```


```
{"summary":"{\n  \"name\": \"df\",\n  \"rows\": 117,\n  \"fields\": [\n    {\n      \"column\": \"text\",\n      \"properties\": {\n\"dtype\": \"string\",\n        \"num_unique_values\": 113,\n\"samples\": [\n          \"Jakarta, CNBC Indonesia- Gelombang pemutusan hubungan kerja (PHK) terjadi di Bangka Belitung (Babel) seiring dengan semakin lesunya industri timah dan berhenti operasinya smelter timah di Bangka Belitung.\\n\\nPlt Ketua Umum Asosiasi Eksportir Timah Indonesia (AETI), Harwendro Adityo Dewanto mengkonfirmasi adanya gelombang PHK yang terjadi di Babel termasuk pegawai smelter timah. Hal ini terkait persoalan hukum yang menjerat 5 smelter serta adanya efek adanya efisiensi di PT Timah Tbk (TINS).\\n\\nSementara Anggota Komisi VII DPR RI, Bambang Patijaya mengatakan saat ini kasus hukum yang terkait smelter telah mendorong PHK dan perumahan karyawan. Hal ini sangat memprihatinkan karena berdampak ke pegawai dan masyarakat yang memiliki hubungan kerjasama dengan smelter terkait.\\n\\nSeperti apa kondisi PHK karyawan terkait smelter timah? Selengkapnya simak dialog Syarifah Rahma dengan Plt Ketua Umum Asosiasi Eksportir Timah Indonesia (AETI), Harwendro Adityo Dewanto dan Anggota Komisi VII DPR RI, Bambang Patijaya dalam Closing Bell,CNBCIndonesia (Selasa, 23/04/2024)\\n\\nSaksikan live streaming program-program CNBC Indonesia TV lainnya di sini\",\n\"KOMPAS.com - Presiden Joko Widodo (Jokowi) dijadwalkan bakal menghadiri puncak peringatan Hari Otonomi Daerah (Otoda) yang akan digelar di Balai Kota Surabaya, Kamis (25/4/2024).\\n\\nPlt Kepala Dinas Komunikasi dan Informatika (Diskominfo) Surabaya, M Fikser mengatakan, informasi itu didapatkanya dari Direktorat Evaluasi Kinerja dan Peningkatan Kapasitas Daerah Direktorat Jenderal Otonomi Daerah Kementerian Dalam Negeri (Kemendagri).\\n\\n\\\"Puncak Peringatan Hari Otonomi Daerah direncanakan akan dihadiri pula oleh Bapak Presiden Republik Indonesia (Jokowi),\\\" kata Fikser ketika dikonfirmasi melalui pesan, Selasa (23/4/2024).\\n\\nBaca juga: Soal RUU DKJ, Ganjar: Kalau Konsisten dengan Otonomi Daerah, Gubernur Dipilih Rakyat!\\n\\n\\\"Beliau sekaligus akan menyematkan tanda kehormatan Satyalancana Karya Bhakti Praja Nugraha ke kepala daerah berprestasi berdasarkan hasil EPPD Tahun 2022 terhadap LPPD Tahun 2021,\\\" tambahnya.\\n\\nFikser mengungkapkan, akan ada sejumlah acara dalam agenda Hari Otonomi Daerah XXVIII Tahun 2024, tersebut.
```

Salah satunya, upacara yang rencananya digelar di area Balai Kota Surabaya.\\n\\n\\\"Setelah upacara, rangkaian acara kemudian dilanjutkan dengan Pawai Seni Budaya dan kunjungan ke Mall Pelayanan Publik (MPP) Pemkot Surabaya,\\\" jelasnya.\\n\\nSelain Jokowi, kata Fikser, sejumlah petinggi lain yang diundang dalam acara puncak peringatan Hari Otoda Nasional 2024 tersebut adalah, gubernur dan bupati/wali kota se-Indonesia.\\n\\nBaca juga: Mendagri Harap Optimalisasi Pelaksanaan Otonomi Daerah Terwujud\\n\\nKemudian, para menteri serta kepala badan dari kementerian atau lembaga pemerintahan non kementerian (LPNK), khususnya anggota tim nasional EPPD juga turut diundang dalam kegiatan itu.\\n\\nKemudian, agenda itu juga mengundang pejabat eselon I di lingkup kemendagri dan BNPP, pejabat eselon II di lingkup sekretariat jenderal kemendagri dan ditjen otonomi daerah, serta Forkopimda Jatim dan Surabaya.\",\n \"JADWAL lengkap tim bulu tangkis Indonesia di Piala Thomas dan Uber 2024 akan dibahas Okezone. Seluruh pertandingan akan disiarkan secara ekslusif di iNews TV.\\n\\nGelaran Piala Thomas dan Uber 2024 akan berlangsung di Chengdu, China. Turnamen akan berlangsung pada 28 April-5 Mei 2024.\\n\\nPada ajang Piala Thomas 2024, Tim Bulu Tangkis Indonesia tergabung di Grup C. Tim Merah-Putih berada satu grup dengan Thailand, Inggris dan juara bertahan India.\\n\\nMelihat dari calon lawan, persaingan di Grup C akan berlangsung ketat. Keempat negara penghuni Grup C cukup berimbang untuk bersaing melaju ke babak berikutnya.\\n\\nTim bulu tangkis Indonesia akan menghadapi Inggris di laga pembuka. Pertandingan akan digelar pada Sabtu 27 April 2024.\\n\\nFollow Berita Okezone di Google News\\n\\nDapatkan berita up to date dengan semua berita terkini dari Okezone hanya dengan satu akun di ORION, daftar sekarang dengan klik disini dan nantikan kejutan menarik lainnya\\n\\nBeralih ke Piala Uber 2024, Srikandi Merah-Putih tergabung di C. Berbeda dengan tim putra, tim bulu tangkis putri Indonesia cenderung tidak menghadapi banyak lawan berat di fase grup. Indonesia tergabung di Grup C bersama Jepang, Hong Kong dan Uganda. Melihat kekuatan dari tiap negara, Indonesia seharusnya bisa lolos bersama Jepang ke babak berikutnya. BACA JUGA: Piala Thomas 2024: Alwi Farhan Sudah Punya Gambaran jika Diturunkan di Partai Penentuan Berikut Jadwal Lengkap Indonesia di Thomas dan Uber Cup 2024: Piala Thomas Sabtu, 27 April 2024, pukul 18.00 WIB Indonesia vs Inggris Senin, 29 April 2024, pukul 9.30 WIB Indonesia vs Thailand Rabu, 1 Mei 2024 pukul 17.00 WIB Indonesia vs India Piala Uber Sabtu, 27 April 2024, pukul 13.00 WIB Indonesia vs Hong Kong Senin, 29 April 2024 pukul 17.00 WIB Indonesia vs Uganda Rabu, 1 Mei 2024 pukul 9.30 WIB Indonesia vs Jepang Perempatfinal Kamis, 2 Mei 2024 Pukul 9.30 WIB, perempatfinal Uber Pukul 17.00 WIB, perempatfinal Thomas Jumat, 3 Mei 2024 Pukul 9.30 WIB, perempatfinal Uber Pukul 17.00 WIB, perempatfinal Thomas Semifinal Sabtu, 4 Mei 2024 Pukul 9.30 WIB, semifinal Uber Pukul 17.00 WIB, semifinal Thomas Final Minggu, 5 Mei 2024 Pukul 9.30 WIB, Uber Cup Final Pukul 17.00 WIB, Thomas Cup Final\"\n],\n \"semantic_type\": \"\",\n \"description\": \"\"\n }\n },\n {\n \"column\": \"media\",\n \"properties\": {\

```
n        \"dtype\": \"category\",\n        \"num_unique_values\": 7,\n
\"samples\": [\n          \"kompas\",\n          \"antaranews\",\n
\"cnbcindonesia\"\n        ],\n        \"semantic_type\": \"\",\n
\"description\": \"\"\n      }\n    },\n    {\n      \"column\":
\"label\",\n      \"properties\": {\n        \"dtype\": \"category\",\
n        \"num_unique_values\": 4,\n        \"samples\": [\n
\"olahraga\",\n          \"hiburan\",\n          \"politik\"\
n        ],\n        \"semantic_type\": \"\",\n
\"description\": \"\"\n      }\n    }\n  ]\
n}","type":"dataframe","variable_name":"df"}
```


Hanya melakukan pengecekan untuk data yang sudah ada

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 117 entries, 0 to 116
Data columns (total 3 columns):
 #   Column  Non-Null Count  Dtype
---  ------  --------------  -----
 0   text    117 non-null    object
 1   media   117 non-null    object
 2   label   117 non-null    object
dtypes: object(3)
memory usage: 2.9+ KB
```

Untuk mencari info dataframe

```
df.describe()
```


```
{"summary":"{\n  \"name\": \"df\",\n  \"rows\": 4,\n  \"fields\": [\n
{\n      \"column\": \"text\",\n      \"properties\": {\n
\"dtype\": \"string\",\n        \"num_unique_values\": 4,\n
\"samples\": [\n          113,\n          \"3\",\n          \"117\"\n
],\n        \"semantic_type\": \"\",\n        \"description\": \"\"\n
}\n    },\n    {\n      \"column\": \"media\",\n      \"properties\":
{\n        \"dtype\": \"string\",\n        \"num_unique_values\": 4,\n
\"samples\": [\n          7,\n          \"46\",\n          \"117\"\n
],\n        \"semantic_type\": \"\",\n        \"description\": \"\"\n
}\n    },\n    {\n      \"column\": \"label\",\n      \"properties\":
{\n        \"dtype\": \"string\",\n        \"num_unique_values\": 4,\n
\"samples\": [\n          4,\n          \"36\",\n          \"117\"\n
],\n        \"semantic_type\": \"\",\n        \"description\": \"\"\n
}\n    }\n  ]\n}","type":"dataframe"}
```


Hanya mencari description dari beberapa kolom

```
df.isna().sum()
```

```
text     0
media    0
label    0
dtype: int64
```

Mencari data kosong dan hasilnya tidak ada NULL data

```
import pandas as pd
import nltk
from nltk.corpus import stopwords
from nltk.tokenize import word_tokenize
import string

nltk.download('stopwords')
nltk.download('punkt')

def preprocess_text(text):

    tokens = word_tokenize(text.lower())
    stop_words = set(stopwords.words('indonesian'))
    punctuation = set(string.punctuation)
    filtered_tokens = [word for word in tokens if word.isalnum() and
word not in stop_words and word not in punctuation]
    clean_text = ' '.join(filtered_tokens)

    return clean_text


df['clean_text'] = df['text'].apply(preprocess_text)
df_preprocess = df[['text', 'clean_text','media','label']]
df_preprocess
```

```
[nltk_data] Downloading package stopwords to /root/nltk_data...
[nltk_data]   Package stopwords is already up-to-date!
[nltk_data] Downloading package punkt to /root/nltk_data...
[nltk_data]   Package punkt is already up-to-date!
```


```
{"summary":"{\n  \"name\": \"df_preprocess\",\n  \"rows\": 117,\n
\"fields\": [\n    {\n      \"column\": \"text\",\n
\"properties\": {\n        \"dtype\": \"string\",\n
\"num_unique_values\": 113,\n        \"samples\": [\n
\"Jakarta, CNBC Indonesia- Gelombang pemutusan hubungan kerja (PHK)
terjadi di Bangka Belitung (Babel) seiring dengan semakin lesunya
industri timah dan berhenti operasinya smelter timah di Bangka
Belitung.\\n\\nPlt Ketua Umum Asosiasi Eksportir Timah Indonesia
(AETI), Harwendro Adityo Dewanto mengkonfirmasi adanya gelombang PHK
yang terjadi di Babel termasuk pegawai smelter timah. Hal ini terkait
persoalan hukum yang menjerat 5 smelter serta adanya efek adanya
efisiensi di PT Timah Tbk (TINS).\\n\\nSementara Anggota Komisi VII
DPR RI, Bambang Patijaya mengatakan saat ini kasus hukum yang terkait
```

smelter telah mendorong PHK dan perumahan karyawan. Hal ini sangat memprihatinkan karena berdampak ke pegawai dan masyarakat yang memiliki hubungan kerjasama dengan smelter terkait.\\n\\nSeperti apa kondisi PHK karyawan terkait smelter timah? Selengkapnya simak dialog Syarifah Rahma dengan Plt Ketua Umum Asosiasi Eksportir Timah Indonesia (AETI), Harwendro Adityo Dewanto dan Anggota Komisi VII DPR RI, Bambang Patijaya dalam Closing Bell,CNBCIndonesia (Selasa, 23/04/2024)\\n\\nSaksikan live streaming program-program CNBC Indonesia TV lainnya di sini\",\n \"KOMPAS.com - Presiden Joko Widodo (Jokowi) dijadwalkan bakal menghadiri puncak peringatan Hari Otonomi Daerah (Otoda) yang akan digelar di Balai Kota Surabaya, Kamis (25/4/2024).\\n\\nPlt Kepala Dinas Komunikasi dan Informatika (Diskominfo) Surabaya, M Fikser mengatakan, informasi itu didapatkanya dari Direktorat Evaluasi Kinerja dan Peningkatan Kapasitas Daerah Direktorat Jenderal Otonomi Daerah Kementerian Dalam Negeri (Kemendagri).\\n\\n\\\"Puncak Peringatan Hari Otonomi Daerah direncanakan akan dihadiri pula oleh Bapak Presiden Republik Indonesia (Jokowi),\\\" kata Fikser ketika dikonfirmasi melalui pesan, Selasa (23/4/2024).\\n\\nBaca juga: Soal RUU DKJ, Ganjar: Kalau Konsisten dengan Otonomi Daerah, Gubernur Dipilih Rakyat!\\n\\n\\\"Beliau sekaligus akan menyematkan tanda kehormatan Satyalancana Karya Bhakti Praja Nugraha ke kepala daerah berprestasi berdasarkan hasil EPPD Tahun 2022 terhadap LPPD Tahun 2021,\\\" tambahnya.\\n\\nFikser mengungkapkan, akan ada sejumlah acara dalam agenda Hari Otonomi Daerah XXVIII Tahun 2024, tersebut. Salah satunya, upacara yang rencananya digelar di area Balai Kota Surabaya.\\n\\n\\\"Setelah upacara, rangkaian acara kemudian dilanjutkan dengan Pawai Seni Budaya dan kunjungan ke Mall Pelayanan Publik (MPP) Pemkot Surabaya,\\\" jelasnya.\\n\\nSelain Jokowi, kata Fikser, sejumlah petinggi lain yang diundang dalam acara puncak peringatan Hari Otoda Nasional 2024 tersebut adalah, gubernur dan bupati/wali kota se-Indonesia.\\n\\nBaca juga: Mendagri Harap Optimalisasi Pelaksanaan Otonomi Daerah Terwujud\\n\\nKemudian, para menteri serta kepala badan dari kementerian atau lembaga pemerintahan non kementerian (LPNK), khususnya anggota tim nasional EPPD juga turut diundang dalam kegiatan itu.\\n\\nKemudian, agenda itu juga mengundang pejabat eselon I di lingkup kemendagri dan BNPP, pejabat eselon II di lingkup sekretariat jenderal kemendagri dan ditjen otonomi daerah, serta Forkopimda Jatim dan Surabaya.\",\n \"JADWAL lengkap tim bulu tangkis Indonesia di Piala Thomas dan Uber 2024 akan dibahas Okezone. Seluruh pertandingan akan disiarkan secara ekslusif di iNews TV.\\n\\nGelaran Piala Thomas dan Uber 2024 akan berlangsung di Chengdu, China. Turnamen akan berlangsung pada 28 April-5 Mei 2024.\\n\\nPada ajang Piala Thomas 2024, Tim Bulu Tangkis Indonesia tergabung di Grup C. Tim Merah-Putih berada satu grup dengan Thailand, Inggris dan juara bertahan India.\\n\\nMelihat dari calon lawan, persaingan di Grup C akan berlangsung ketat. Keempat negara penghuni Grup C cukup berimbang untuk bersaing melaju ke babak berikutnya.\\n\\nTim bulu tangkis Indonesia akan menghadapi Inggris di laga pembuka. Pertandingan akan

digelar pada Sabtu 27 April 2024.\\n\\nFollow Berita Okezone di Google News\\n\\nDapatkan berita up to date dengan semua berita terkini dari Okezone hanya dengan satu akun di ORION, daftar sekarang dengan klik disini dan nantikan kejutan menarik lainnya\\n\\nBeralih ke Piala Uber 2024, Srikandi Merah-Putih tergabung di C. Berbeda dengan tim putra, tim bulu tangkis putri Indonesia cenderung tidak menghadapi banyak lawan berat di fase grup. Indonesia tergabung di Grup C bersama Jepang, Hong Kong dan Uganda. Melihat kekuatan dari tiap negara, Indonesia seharusnya bisa lolos bersama Jepang ke babak berikutnya. BACA JUGA: Piala Thomas 2024: Alwi Farhan Sudah Punya Gambaran jika Diturunkan di Partai Penentuan Berikut Jadwal Lengkap Indonesia di Thomas dan Uber Cup 2024: Piala Thomas Sabtu, 27 April 2024, pukul 18.00 WIB Indonesia vs Inggris Senin, 29 April 2024, pukul 9.30 WIB Indonesia vs Thailand Rabu, 1 Mei 2024 pukul 17.00 WIB Indonesia vs India Piala Uber Sabtu, 27 April 2024, pukul 13.00 WIB Indonesia vs Hong Kong Senin, 29 April 2024 pukul 17.00 WIB Indonesia vs Uganda Rabu, 1 Mei 2024 pukul 9.30 WIB Indonesia vs Jepang Perempatfinal Kamis, 2 Mei 2024 Pukul 9.30 WIB, perempatfinal Uber Pukul 17.00 WIB, perempatfinal Thomas Jumat, 3 Mei 2024 Pukul 9.30 WIB, perempatfinal Uber Pukul 17.00 WIB, perempatfinal Thomas Semifinal Sabtu, 4 Mei 2024 Pukul 9.30 WIB, semifinal Uber Pukul 17.00 WIB, semifinal Thomas Final Minggu, 5 Mei 2024 Pukul 9.30 WIB, Uber Cup Final Pukul 17.00 WIB, Thomas Cup Final\"\n   ],\n   \"semantic_type\": \"\",\n \"description\": \"\"\n   }\n   },\n   {\n   \"column\": \"clean_text\",\n   \"properties\": {\n   \"dtype\": \"string\",\n   \"num_unique_values\": 113,\n   \"samples\": [\n   \"jakarta cnbc gelombang pemutusan hubungan kerja phk bangka belitung babel seiring lesunya industri timah berhenti operasinya smelter timah bangka belitung plt ketua asosiasi eksportir timah indonesia aeti harwendro adityo dewanto mengkonfirmasi gelombang phk babel pegawai smelter timah terkait hukum menjerat 5 smelter efek efisiensi pt timah tbk tins anggota komisi vii dpr ri bambang patijaya hukum terkait smelter mendorong phk perumahan karyawan memprihatinkan berdampak pegawai masyarakat memiliki hubungan kerjasama smelter terkait kondisi phk karyawan terkait smelter timah selengkapnya simak dialog syarifah rahma plt ketua asosiasi eksportir timah indonesia aeti harwendro adityo dewanto anggota komisi vii dpr ri bambang patijaya closing bell cnbcindonesia selasa saksikan live streaming cnbc indonesia tv\",\n   \"presiden joko widodo jokowi dijadwalkan menghadiri puncak peringatan otonomi daerah otoda digelar balai kota surabaya kamis plt kepala dinas komunikasi informatika diskominfo surabaya m fikser informasi didapatkanya direktorat evaluasi kinerja peningkatan kapasitas daerah direktorat jenderal otonomi daerah kementerian negeri kemendagri puncak peringatan otonomi daerah direncanakan dihadiri presiden republik indonesia jokowi fikser dikonfirmasi pesan selasa baca ruu dkj ganjar konsisten otonomi daerah gubernur dipilih rakyat beliau menyematkan tanda kehormatan satyalancana karya bhakti praja nugraha kepala daerah berprestasi berdasarkan hasil eppd 2022 lppd 2021 fikser acara agenda otonomi

```
daerah xxviii 2024 salah satunya upacara rencananya digelar area balai
kota surabaya upacara rangkaian acara dilanjutkan pawai seni budaya
kunjungan mall pelayanan publik mpp pemkot surabaya jokowi fikser
petinggi diundang acara puncak peringatan otoda nasional 2024 gubernur
kota baca mendagri harap optimalisasi pelaksanaan otonomi daerah
terwujud menteri kepala badan kementerian lembaga pemerintahan non
kementerian lpnk anggota tim nasional eppd diundang kegiatan agenda
mengundang pejabat eselon i lingkup kemendagri bnpp pejabat eselon ii
lingkup sekretariat jenderal kemendagri ditjen otonomi daerah
forkopimda jatim surabaya\",\n          \"jadwal lengkap tim bulu
tangkis indonesia piala thomas uber 2024 dibahas okezone pertandingan
disiarkan ekslusif inews tv gelaran piala thomas uber 2024 chengdu
china turnamen 28 mei ajang piala thomas 2024 tim bulu tangkis
indonesia tergabung grup tim grup thailand inggris juara bertahan
india calon lawan persaingan grup c ketat keempat negara penghuni grup
c berimbang bersaing melaju babak tim bulu tangkis indonesia
menghadapi inggris laga pembuka pertandingan digelar sabtu 27 april
follow berita okezone google news dapatkan berita up to date berita
terkini okezone akun orion daftar klik nantikan kejutan menarik
beralih piala uber 2024 srikandi tergabung berbeda tim putra tim bulu
tangkis putri indonesia cenderung menghadapi lawan berat fase grup
indonesia tergabung grup c jepang hong kong uganda kekuatan negara
indonesia lolos jepang babak baca piala thomas 2024 alwi farhan
gambaran diturunkan partai penentuan jadwal lengkap indonesia thomas
uber cup 2024 piala thomas sabtu 27 april 2024 wib indonesia vs
inggris senin 29 april 2024 wib indonesia vs thailand rabu 1 mei 2024
wib indonesia vs india piala uber sabtu 27 april 2024 wib indonesia vs
hong kong senin 29 april 2024 wib indonesia vs uganda rabu 1 mei 2024
wib indonesia vs jepang perempatfinal kamis 2 mei 2024 wib
perempatfinal uber wib perempatfinal thomas jumat 3 mei 2024 wib
perempatfinal uber wib perempatfinal thomas semifinal sabtu 4 mei 2024
wib semifinal uber wib semifinal thomas final minggu 5 mei 2024 wib
uber cup final wib thomas cup final\"\n        ],\n
\"semantic_type\": \"\",\n        \"description\": \"\"\n      }\
n    },\n    {\n      \"column\": \"media\",\n      \"properties\": {\
n        \"dtype\": \"category\",\n        \"num_unique_values\": 7,\n
\"samples\": [\n          \"kompas\",\n          \"antaranews\",\n
\"cnbcindonesia\"\n        ],\n        \"semantic_type\": \"\",\n
\"description\": \"\"\n      }\n    },\n    {\n      \"column\":
\"label\",\n      \"properties\": {\n        \"dtype\": \"category\",\
n        \"num_unique_values\": 4,\n        \"samples\": [\n
\"olahraga\",\n          \"hiburan\",\n          \"politik\"\
n        ],\n        \"semantic_type\": \"\",\n
\"description\": \"\"\n      }\n    }\n  ]\
n}","type":"dataframe","variable_name":"df_preprocess"}
```


Pertama-tama saya mengimpor beberapa library dari Pandas, NLTK, stopwords, string.

Kedua saya melakukan import terhadap stopwords dan tokinizer untuk bahasa Indonesia.

Setelah saya membuat function preprocess_text untuk melakukan tokenisasi, hapus beberapa tanda baca dan stopwords dan kemudian saya compile kembali teks yang sudah dibersihkan sebelumnya.

Saya menerapkan function diatas ke dalam DF yang sudah saya impor teks yang belum dibersihkan dan kemudian saya simpan di DataFrame.

Lalu saya menampilkan kolom text, clean_text, media, label seperti tabel diatas

```
df_preprocess.to_csv('UTS_Preprocessed_CSV.csv',index = False)
```

Saya hanya menyimpan CSV yang sudah dibersihkan untuk backup

3. Melakukan text representation dengan menggunakan 2 metode, metode pertama adalah metode yang memberikan informasi seberapa penting sebuah kata dalam suatu sample data atau dokumen yang berada dalam kumpulan dataset. Metode kedua adalah metode representasi kata ke dalam suatu set vektor yang menggambarkan penggunaannya dalam konteks, size vektor adalah 50, dan frequency kata yang diperhitungkan minimal 3. Vektor yang dihasilkan harus berdasarkan hasil training dengan input kata dan target output konteks. Jelaskan langkah-langkah yang anda lakukan.

```
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.feature_extraction.text import TfidfVectorizer
import nltk
from nltk.corpus import stopwords
from nltk.tokenize import word_tokenize
import string

x = df_preprocess.drop('label',axis = 1)
y = df_preprocess['label']

X_train, X_test, y_train, y_test = train_test_split(x, y,
test_size=0.2, random_state=42)

tfidf_vectorizer = TfidfVectorizer(min_df=3, max_features=50)
X_train_tfidf = tfidf_vectorizer.fit_transform(X_train['clean_text'])
X_test_tfidf = tfidf_vectorizer.transform(X_test['clean_text'])
tfidf_df = pd.DataFrame(X_train_tfidf.toarray(),
```

```
columns=tfidf_vectorizer.get_feature_names_out())
tfidf_df
```

{"type":"dataframe","variable_name":"tfidf_df"}

Pertama-tama saya melakukan train test split untuk data yang teksnya sudah bersih sebelumnya. Saya memisahkan untuk y sebagai label dan x sebagai fitur. Kemudian saya membagikan data untuk X_test dan Y_test dengan 80% dan 20% dengan random state 42. TF-IDF adalah suatu metode yang saya gunakan untuk mengonversikan teks menjadi vektor TFIDF dan menunjukan kata yang muncul dalam 3 dokumen dan max_features harus 50. Setelah itu fit_transform dan latih untuk data uji seperti x_train dan x_test. Membuat dataframe untuk nama fitur.

```
from gensim.models import Word2Vec
import nltk
import numpy as np
nltk.download('punkt')

tokenized_X_train = [nltk.word_tokenize(text) for text in
X_train['clean_text']]
tokenized_X_test = [nltk.word_tokenize(text) for text in
X_test['clean_text']]
word2vec_model = Word2Vec(sentences=tokenized_X_train, vector_size=50,
min_count=3)
def average_word_vectors(tokens, model, vocabulary, num_features):
    feature_vector = np.zeros((num_features,), dtype="float64")
    nwords = 0.

    for word in tokens:
        if word in vocabulary:
            nwords = nwords + 1.
            feature_vector = np.add(feature_vector, model.wv[word])

    if nwords:
        feature_vector = np.divide(feature_vector, nwords)

    return feature_vector

vocabulary = set(word2vec_model.wv.index_to_key)
X_train_avg_wordvec = [average_word_vectors(tokens, word2vec_model,
vocabulary, 50) for tokens in tokenized_X_train]
X_test_avg_wordvec = [average_word_vectors(tokens, word2vec_model,
vocabulary, 50) for tokens in tokenized_X_test]
```

```
[nltk_data] Downloading package punkt to /root/nltk_data...
[nltk_data]   Package punkt is already up-to-date!
```

Import beberapa library seperti Word2Vec dari Gensim, NLTK, numpy, tokenizer. Melakukan tokenisasi terhadap X_train, X_test untuk memecah teks menjadi kata-kata masing2. Setelah itu adanya training dari Word2Vec dengan syarat vector_size = 50 dan minimum kata muncul

adalah 3. Setelah itu function average_word_function digunakna untuk hitung vector dalam sebuah dokumen. Vocabulary untuk mendapatkan kata yang terdapat pada word2vec. Konversi ke teks ke vektor rata-rata.

```
X_train_avg_wordvec
```

```
[array([-0.00387293,  0.00226242,  0.00449036, -0.00363427, -
0.01082973,
        -0.02493189,  0.0130026 ,  0.03136553, -0.03871638, -0.0132031
,
        -0.00704304, -0.01377256,  0.00165129, -0.00160138, -
0.01594418,
         0.01249886,  0.02440253,  0.00441051, -0.0295421 , -
0.01141807,
         0.00372551,  0.00414811,  0.03313859, -0.00934496,
0.01665969,
         0.01991526, -0.01740552, -0.00608359, -0.02264158,
0.01215368,
         0.00610997, -0.01017514,  0.00054992,  0.01439636, -
0.00530896,
         0.02202475,  0.00099891,  0.0090559 , -0.00010475, -
0.01799552,
         0.02118429, -0.00586617, -0.00466366,  0.00269436,
0.02714602,
         0.00148514, -0.00096405, -0.02350947,  0.01768237,
0.01281209]),
 array([-3.07500955e-03,  2.48825867e-03,  5.61243605e-03, -
3.02792398e-03,
        -1.34428455e-02, -2.25171241e-02,  1.31755467e-02,
3.31384539e-02,
        -3.59697725e-02, -8.92009671e-03, -6.22120815e-03, -
1.01470691e-02,
         4.04295593e-03,  1.28378632e-03, -1.55970583e-02,
1.15307585e-02,
         2.64454343e-02,  2.15707775e-03, -2.64113848e-02, -
1.63194888e-02,
         8.04958706e-03,  9.51171473e-03,  3.28990258e-02, -
1.10803414e-02,
         1.37826843e-02,  1.70070750e-02, -1.51285476e-02, -
7.59539792e-03,
        -1.99476118e-02,  1.19130888e-02,  8.34981942e-03, -
9.30433392e-03,
         3.36027423e-04,  7.90530958e-03, -8.70548082e-03,
2.66136548e-02,
        -3.34190534e-03,  1.03019293e-02, -4.22310773e-03, -
1.86114498e-02,
         1.99623866e-02, -5.87928843e-03, -4.71264793e-03,
3.67636743e-03,
         2.73753939e-02, -5.33012412e-05,  8.28825602e-04, -
2.32072079e-02,
```

```
         1.42882131e-02,  1.01878023e-02]),
 array([-0.00197929,  0.00012137,  0.00248886,  0.00483591, -0.0226512
,
        -0.03494857,  0.02062267,  0.05537348, -0.05996218, -
0.01435045,
        -0.0095826 , -0.02139736,  0.0002392 ,  0.00124515, -
0.02237973,
         0.01608018,  0.03980023, -0.00026693, -0.04885632, -
0.03054984,
         0.00631747,  0.00946731,  0.05297456, -0.01455367,
0.02156017,
         0.02661534, -0.0245748 , -0.00681208, -0.03785396,
0.01815882,
         0.01352565, -0.0158373 ,  0.00293782,  0.01434951, -
0.01437647,
         0.03765596,  0.00270131,  0.00871828, -0.00501766, -0.0293588
,
         0.03241821, -0.00990951, -0.01067641,  0.00390317,
0.04843682,
        -0.00241211,  0.00199818, -0.03666292,  0.02732322,  0.0197566
]),
 array([-0.00073733, -0.0025072 ,  0.00125279,  0.00523766, -
0.02670071,
        -0.04366792,  0.02392224,  0.06543931, -0.06634929, -0.0168059
,
        -0.01221588, -0.02488052, -0.00045178,  0.0038039 , -
0.02577012,
         0.01897264,  0.04593795, -0.00237875, -0.05578993, -
0.03694467,
         0.00695002,  0.01045127,  0.06199866, -0.01830754,
0.02746346,
         0.0294569 , -0.02848774, -0.00713617, -0.04415803,
0.01970166,
         0.01403248, -0.01891944,  0.00209502,  0.01820855, -
0.01657044,
         0.04296696,  0.00534557,  0.00810637, -0.00554634, -
0.03532191,
         0.03499745, -0.01053942, -0.01329861,  0.00447373,
0.05524258,
        -0.0007134 ,  0.00286172, -0.04027299,  0.03134257,
0.02269923]),
 array([-0.00062831,  0.00166731,  0.0053098 ,  0.00271425, -
0.01914457,
        -0.03115306,  0.01772737,  0.04007675, -0.05460192, -
0.01423994,
        -0.00942493, -0.0198366 ,  0.00044871, -0.00157806, -0.0221409
,
         0.01267224,  0.03615978,  0.00270838, -0.0407241 , -
0.02420021,
```

```
         0.00536279,  0.00807715,  0.04367923, -0.01648634,  0.0194556
,
         0.02554123, -0.02251182, -0.00677626, -0.02850088,
0.01575856,
         0.00865222, -0.00984243,  0.00334241,  0.01642136, -
0.01342862,
         0.03394771, -0.0006998 ,  0.00985781, -0.00322918, -
0.02885596,
         0.03199326, -0.0106911 , -0.00485778,  0.00181698,
0.04557664,
         0.00183847,  0.00636395, -0.03249239,  0.02162866,
0.01656514]),
 array([ 0.00019255, -0.00053903,  0.00229999,  0.00314485, -
0.02458035,
        -0.0393033 ,  0.02578405,  0.06278374, -0.06516913, -0.0162692
,
        -0.01010345, -0.0253041 , -0.00216694,  0.00211614, -
0.02585942,
         0.01985679,  0.04574016, -0.00539457, -0.05264562, -
0.03504698,
         0.00731488,  0.00895629,  0.06186504, -0.01836258,
0.02496398,
         0.02730228, -0.02619753, -0.00965415, -0.04203483,
0.01998142,
         0.0128979 , -0.01551472,  0.00481885,  0.01535133, -
0.01532106,
         0.04196025,  0.00466437,  0.0080305 , -0.00413026, -
0.03641463,
         0.035709  , -0.00847753, -0.01119769,  0.00609619,
0.05491964,
         0.00094357,  0.00288247, -0.03912758,  0.03184207,
0.02210335]),
 array([-0.00109718, -0.00273386,  0.00396622,  0.00440475, -
0.01772689,
        -0.0264411 ,  0.02212805,  0.03816693, -0.04542241, -
0.01189411,
        -0.00705936, -0.01903011,  0.00126827,  0.00022072, -
0.01660063,
         0.01332003,  0.03440252,  0.00052217, -0.03530556, -
0.01765264,
         0.00676143,  0.01058089,  0.04089403, -0.01774594,
0.01985136,
         0.02121953, -0.01919291, -0.00596245, -0.02554836,
0.01153508,
         0.00753388, -0.01159098, -0.0005388 ,  0.01509152, -
0.00989151,
         0.02389843,  0.00521423,  0.00726339, -0.00751012, -
0.02652377,
         0.02677694, -0.00995132, -0.00553588,  0.00140488,
```

```
0.03262665,
        -0.00122899,  0.00443845, -0.02542264,  0.02208013,
0.01568283]),
 array([-3.03012671e-04,  4.93965199e-03,  8.94552439e-03,
8.20200995e-04,
        -1.92575918e-02, -3.19375280e-02,  1.59833438e-02,
4.36161996e-02,
        -5.14073043e-02, -1.29098900e-02, -7.38666383e-03, -
1.72312518e-02,
         1.56081981e-03, -7.03859430e-05, -1.72538942e-02,
1.32339672e-02,
         3.20327867e-02,  5.01677199e-03, -3.49629769e-02, -
2.44935335e-02,
         4.13116446e-03,  1.22915742e-02,  4.43995129e-02, -
1.68820096e-02,
         1.58393348e-02,  2.28141715e-02, -2.49348552e-02, -
9.46494023e-03,
        -2.75131579e-02,  1.22183363e-02,  7.13109668e-03, -
1.70893414e-02,
         3.25355316e-03,  1.50369393e-02, -1.38148237e-02,
3.14160706e-02,
         1.28522379e-03,  7.87284503e-03, -3.87235491e-03, -
2.74096735e-02,
         3.08598886e-02, -1.42005922e-02, -2.38705071e-03,
8.78251260e-03,
         3.67268218e-02, -8.12160869e-04,  6.39502538e-03, -
2.79696934e-02,
         2.19764006e-02,  1.31194796e-02]),
 array([ 0.00342511,  0.00458399,  0.00592371,  0.00054286, -
0.01664226,
        -0.01684313,  0.00924543,  0.03321972, -0.02998789, -
0.00905139,
        -0.00667988, -0.01168319, -0.00190256,  0.00157052, -
0.01220923,
         0.01160617,  0.02122934,  0.00329144, -0.02468627, -0.0215473
,
         0.00439008,  0.00267244,  0.02793502, -0.00828836,
0.01241948,
         0.01690088, -0.01518363, -0.00335662, -0.01719497,
0.00861748,
         0.00141118, -0.00954786,  0.00567399,  0.00846488, -
0.01032489,
         0.01909188,  0.00229214,  0.00375157, -0.00260834, -
0.01587597,
         0.02419817, -0.00469156, -0.00474168,  0.0054402 ,
0.02404294,
         0.00112253,  0.00565209, -0.01821084,  0.01503407,
0.00773297]),
 array([-0.00183954, -0.00028307,  0.00210532,  0.00250269, -
```

```
0.02616718,
        -0.0431555 ,  0.02824676,  0.06920789, -0.07109242, -
0.01566441,
        -0.01036529, -0.02507857, -0.00232671,  0.00312982, -
0.02771153,
         0.01730037,  0.04720805, -0.0043733 , -0.05476936, -
0.03681766,
         0.01022745,  0.00974121,  0.06477634, -0.01970383,
0.02724921,
         0.03009366, -0.03111057, -0.01046561, -0.04696247,
0.02172246,
         0.01322888, -0.01795619,  0.00203595,  0.01542068, -
0.01492516,
         0.04354153,  0.00434016,  0.01066116, -0.0052629 , -0.0391906
,
         0.03712028, -0.01083554, -0.01306337,  0.00387527,
0.05646785,
        -0.00227079,  0.0025635 , -0.04266861,  0.0351567 ,
0.02226173]),
 array([-0.00031528,  0.00011504,  0.00464995, -0.00043425, -
0.01675986,
        -0.02043977,  0.01224894,  0.03474984, -0.0386855 , -
0.00964083,
        -0.00799357, -0.01300713,  0.00102153,  0.0038461 , -
0.01667849,
         0.01272383,  0.02296403,  0.00338877, -0.02841391, -
0.01902542,
         0.00350273,  0.00639224,  0.03253906, -0.0110661 ,
0.01326675,
         0.01795105, -0.01266621, -0.00679003, -0.02301789,
0.01150546,
         0.00991377, -0.01065491, -0.00127595,  0.01240239, -
0.00681266,
         0.02333389,  0.003345  ,  0.01041195, -0.00114163, -
0.02133342,
         0.01937893, -0.00375385, -0.00668382,  0.00362608,
0.03094427,
        -0.00092873,  0.0053686 , -0.02400578,  0.02009918,
0.01347633]),
 array([-2.11101134e-05,  4.63360583e-03,  3.78508326e-03, -
6.68769554e-04,
        -2.12271940e-02, -2.85999870e-02,  2.00827824e-02,
4.01118097e-02,
        -4.86529904e-02, -1.45639836e-02, -8.41064285e-03, -
1.52589640e-02,
         5.55600292e-03,  1.40820026e-04, -1.60804457e-02,
9.56914155e-03,
         3.13000757e-02, -1.35889680e-03, -3.52796306e-02, -
2.52862348e-02,
```

```
         6.51917364e-03,  9.13386022e-03,  3.85866605e-02, -
1.60047281e-02,
         1.36695192e-02,  2.35097642e-02, -2.24830921e-02, -
1.34405501e-02,
        -2.63066486e-02,  1.62666897e-02,  9.65936571e-03, -
1.53142782e-02,
        -1.50766964e-03,  9.62218035e-03, -1.33815355e-02,
3.46910460e-02,
        -3.62229261e-03,  9.30104660e-03, -4.58613805e-03, -
2.92657265e-02,
         2.73461334e-02, -1.02054091e-02, -2.70342263e-03,
5.04050447e-03,
         3.60216010e-02, -1.52417764e-03,  4.54522926e-03, -
3.09627301e-02,
         2.32908373e-02,  1.26121831e-02]),
 array([-7.68430686e-04,  1.63360665e-03,  6.90424780e-03,
2.87662518e-03,
        -1.58462808e-02, -2.12249911e-02,  1.22967144e-02,
3.56898164e-02,
        -3.68030175e-02, -4.79823254e-03, -4.17697016e-03, -
1.38697768e-02,
         4.07459328e-03,  2.95051418e-03, -1.47274974e-02,
9.95947963e-03,
         2.32933872e-02, -3.01880381e-03, -2.80388795e-02, -
1.58661767e-02,
         1.40563663e-04,  1.32667448e-02,  2.86414810e-02, -
9.30130867e-03,
         1.62331458e-02,  1.75003216e-02, -1.75691072e-02, -
8.78273714e-03,
        -2.61898409e-02,  1.26503720e-02,  5.69113316e-03, -
1.43961153e-02,
         2.83255812e-03,  1.19671659e-02, -8.98598144e-03,
2.77759047e-02,
        -5.73400050e-04,  5.04033545e-03, -6.17207427e-05, -
1.35624367e-02,
         2.99935155e-02, -1.51194238e-02, -2.81781873e-03,
3.82976899e-03,
         2.57328944e-02,  4.63206552e-03,  1.19573152e-03, -
2.86777674e-02,
         2.16323200e-02,  1.11496380e-02]),
 array([-0.00197929,  0.00012137,  0.00248886,  0.00483591, -0.0226512
,
        -0.03494857,  0.02062267,  0.05537348, -0.05996218, -
0.01435045,
        -0.0095826 , -0.02139736,  0.0002392 ,  0.00124515, -
0.02237973,
         0.01608018,  0.03980023, -0.00026693, -0.04885632, -
0.03054984,
         0.00631747,  0.00946731,  0.05297456, -0.01455367,
```

```
0.02156017,
         0.02661534, -0.0245748 , -0.00681208, -0.03785396,
0.01815882,
         0.01352565, -0.0158373 ,  0.00293782,  0.01434951, -
0.01437647,
         0.03765596,  0.00270131,  0.00871828, -0.00501766, -0.0293588
,
         0.03241821, -0.00990951, -0.01067641,  0.00390317,
0.04843682,
        -0.00241211,  0.00199818, -0.03666292,  0.02732322,  0.0197566
]),
 array([ 0.00018422, -0.00081377,  0.00115332, -0.00013039, -
0.01450206,
        -0.01686084,  0.01460099,  0.02846108, -0.03392046, -
0.00943613,
        -0.00432154, -0.01079896, -0.00485184, -0.00010105, -
0.01293471,
         0.00792317,  0.02160444, -0.00234605, -0.02310581, -
0.01454265,
         0.00324762,  0.00644543,  0.02942278, -0.01031091,
0.00798624,
         0.01616501, -0.01570862, -0.00945466, -0.01958192,  0.0072544
,
         0.00750085, -0.00804326, -0.00145971,  0.00968353, -0.0094312
,
         0.02084096, -0.0042029 ,  0.00750553, -0.00462249, -
0.01925379,
         0.01948666, -0.01017313, -0.00323721,  0.00423955,
0.02078167,
         0.002169  ,  0.00480839, -0.01840084,  0.01672865,
0.01162298]),
 array([-0.00024321,  0.00091752,  0.00274609, -0.00182064, -
0.01661475,
        -0.02521115,  0.0168401 ,  0.03985435, -0.04525861, -
0.01195135,
        -0.00811997, -0.01356263,  0.00153443,  0.00036623, -
0.01899914,
         0.01106205,  0.02714456,  0.00246715, -0.03429331, -
0.02028527,
         0.00737786,  0.00468229,  0.03621545, -0.01155626,
0.01683636,
         0.01678666, -0.01642553, -0.01249345, -0.02167593,
0.01663512,
         0.01222415, -0.00905745,  0.0005807 ,  0.00813282, -
0.00878463,
         0.03050941, -0.00203714,  0.01429412, -0.00487486, -
0.02718971,
         0.02563017, -0.00826228, -0.00352634,  0.00758735,
0.03342145,
```

```
         0.00113856,  0.00497513, -0.02105482,  0.0211433 ,
0.01058274]),
 array([ 9.55375362e-04, -4.34056284e-04,  9.41432679e-04,
3.52900429e-03,
        -2.60651892e-02, -4.11096835e-02,  2.40327401e-02,
6.01461968e-02,
        -6.49984720e-02, -1.55050922e-02, -1.08891236e-02, -
2.53559297e-02,
         1.63448873e-05,  5.01695283e-03, -2.57241282e-02,
1.71726413e-02,
         4.30764613e-02, -2.45403272e-03, -5.36776363e-02, -
3.58907527e-02,
         6.69586929e-03,  8.88241105e-03,  5.94205737e-02, -
1.77089568e-02,
         2.76416805e-02,  2.73896928e-02, -2.59297644e-02, -
8.26947702e-03,
        -4.29370725e-02,  2.01859842e-02,  1.39063760e-02, -
1.79609872e-02,
         2.53455156e-03,  1.46781299e-02, -1.40122356e-02,
3.79457231e-02,
         4.74754051e-03,  9.76926993e-03, -4.81130231e-03, -
3.45278145e-02,
         3.32918162e-02, -1.22179622e-02, -1.25126247e-02,
4.19848651e-03,
         5.31260287e-02, -9.67496964e-05,  2.94924707e-03, -
3.95588576e-02,
         3.30505938e-02,  2.30181934e-02]),
 array([ 0.00101646,  0.00528719,  0.00336522, -0.0002213 , -
0.02011293,
        -0.0289305 ,  0.01710198,  0.03867756, -0.04991244, -
0.01094742,
        -0.00445993, -0.01840093,  0.00094167,  0.00088745, -
0.01905769,
         0.01106087,  0.03051498,  0.0005634 , -0.03799728, -
0.02277317,
         0.00431469,  0.00760461,  0.04128941, -0.01401324,
0.01431202,
         0.02487565, -0.02293968, -0.01166563, -0.02938778,
0.01444654,
         0.00813747, -0.01233432,  0.00276675,  0.01191681, -
0.00881791,
         0.0294599 , -0.00075763,  0.00962984, -0.00372078, -
0.02516694,
         0.02561934, -0.00884566, -0.00084651,  0.00397318,
0.03988196,
         0.0026278 ,  0.00744897, -0.02910087,  0.0235978 ,
0.01437313]),
 array([-4.08276991e-03,  3.27514971e-03,  2.69280829e-03,
1.78660718e-03,
```

```
        -1.55815458e-02, -2.54527787e-02,  1.58168575e-02,
3.84337565e-02,
        -4.32173991e-02, -1.11944048e-02, -8.86939009e-03, -
1.36594415e-02,
         1.23927025e-03, -1.66872199e-04, -1.80193238e-02,
1.21792742e-02,
         3.07494640e-02,  6.57815402e-04, -3.47238214e-02, -
1.97653285e-02,
         3.34599251e-03,  7.98651442e-03,  3.90937933e-02, -
1.03664530e-02,
         1.50825120e-02,  2.16740786e-02, -1.81298349e-02, -
8.39380782e-03,
        -2.87961132e-02,  1.27236831e-02,  8.98672448e-03, -
1.08440762e-02,
         1.75039535e-04,  1.31266111e-02, -9.55622307e-03,
2.70525902e-02,
         6.38685208e-05,  7.82880714e-03, -1.02709751e-03, -
2.37013071e-02,
         2.61247681e-02, -7.31750878e-03, -7.34405728e-03,
4.29356862e-03,
         3.32991030e-02,  3.11570413e-03,  5.37046370e-03, -
2.48331062e-02,
         2.09037830e-02,  1.41385965e-02]),
 array([ 0.00543324, -0.00118014,  0.00820064,  0.00032623, -
0.01349657,
        -0.02167328,  0.0151015 ,  0.03616848, -0.03531255, -
0.00903146,
        -0.00373749, -0.01155807,  0.00086346, -0.00066079, -
0.01827048,
         0.01554446,  0.0269564 , -0.00054184, -0.02364988, -
0.01948598,
         0.00521516,  0.00631608,  0.0369964 , -0.01204593,  0.0136306
,
         0.01812953, -0.01590537, -0.00438386, -0.02413254,
0.01011202,
         0.00520772, -0.00956102,  0.00322845,  0.00656508, -
0.00964671,
         0.02375417, -0.00350935,  0.00553616, -0.0044567 , -
0.01683112,
         0.02135524, -0.00800388, -0.00910471,  0.00104282,
0.02746193,
         0.00131419,  0.00450754, -0.01850637,  0.01869976,
0.01453673]),
 array([-1.46850300e-03,  1.73604770e-03,  3.41731767e-03,
3.20983670e-03,
        -1.23551364e-02, -1.89119121e-02,  1.28861532e-02,
3.10554534e-02,
        -3.60520674e-02, -4.20443832e-03, -5.69426045e-03, -
1.33331147e-02,
```

```
         3.74310166e-03, -3.16877124e-03, -1.34804454e-02,
9.97587503e-03,
         2.39006884e-02,  3.88655563e-03, -2.48977630e-02, -
2.00195701e-02,
         1.96277294e-03,  7.84540285e-03,  2.81843468e-02, -
9.50271467e-03,
         1.48482485e-02,  1.14852500e-02, -1.44048752e-02, -
7.86531923e-03,
        -2.06762490e-02,  8.82732876e-03,  6.67284961e-03, -
8.37095756e-03,
         3.05544828e-03,  1.40639383e-02, -4.02039145e-03,
2.59389284e-02,
         3.92786921e-03,  7.31141392e-03, -3.17967752e-04, -
1.95955644e-02,
         1.83066883e-02, -6.35128193e-03, -5.88243498e-03,
4.31610329e-03,
         2.96990411e-02,  1.68708702e-05,  2.84532455e-03, -
2.13404300e-02,
         1.91526574e-02,  8.55120573e-03]),
 array([-0.00046116,  0.0014387 ,  0.00226726,  0.00302603, -
0.01758132,
        -0.03074884,  0.01907877,  0.04191987, -0.04615951, -
0.01116017,
        -0.00847822, -0.01849958, -0.00089399,  0.00350811, -
0.02021308,
         0.01604868,  0.03028945,  0.00234469, -0.03716702, -
0.02087971,
         0.00346929,  0.00729105,  0.04399754, -0.01523531,
0.01718831,
         0.0239613 , -0.01953666, -0.00947206, -0.02883402,
0.01406941,
         0.01046722, -0.01405726,  0.00362051,  0.01281806, -
0.01149925,
         0.03183854,  0.00268341,  0.00860599, -0.00152083, -
0.02676551,
         0.02815051, -0.01070423, -0.00780263,  0.00377418,
0.04108819,
         0.00318848,  0.00519078, -0.03046091,  0.02100124,  0.0157014
]),
 array([ 0.00137618,  0.00336496,  0.00661218,  0.00168033, -
0.01703485,
        -0.02238711,  0.01474115,  0.03766782, -0.03977561, -
0.01275598,
        -0.00749139, -0.01343122,  0.00196311,  0.00045301, -
0.02025134,
         0.01074449,  0.02462802, -0.00316362, -0.03573162, -
0.01711394,
         0.00356189,  0.00482497,  0.03408267, -0.01553635,  0.0163082
,
```

```
         0.02187475, -0.01325819, -0.01134435, -0.02300562,
0.00893433,
         0.00870496, -0.00957881,  0.00302309,  0.0108139 , -
0.01177697,
         0.02106095,  0.00207597,  0.0048876 , -0.00641732, -
0.02359986,
         0.02111641, -0.00447411, -0.00032591,  0.00154747,
0.03085963,
         0.00467831,  0.003721  , -0.02357596,  0.0169116 ,
0.00997303]),
 array([-0.00017937,  0.00186829,  0.00495441, -0.00101669, -
0.02057739,
        -0.02775457,  0.01310769,  0.04053198, -0.04731089, -0.0151018
,
        -0.00952916, -0.01469378,  0.00287748, -0.00031355, -
0.01617509,
         0.01263106,  0.02915686,  0.00249191, -0.0373883 , -
0.02105091,
         0.00449298,  0.0110903 ,  0.04032964, -0.01375445,
0.01481919,
         0.01972908, -0.01851802, -0.01161954, -0.02555731,
0.01553617,
         0.01092489, -0.01427873,  0.00051266,  0.0131222 , -
0.00796376,
         0.03231495, -0.00059457,  0.00871741, -0.00367982, -
0.02419755,
         0.02571761, -0.00839719, -0.00332076,  0.00268205,
0.03541136,
         0.0029102 ,  0.00422333, -0.02581115,  0.02057358,
0.01203484]),
 array([-0.00318174,  0.00325289,  0.00652998, -0.00127723, -
0.01491497,
        -0.02965418,  0.01745902,  0.03894985, -0.05048466, -
0.01383241,
        -0.00857182, -0.01879769,  0.00116747, -0.00134416, -
0.01942077,
         0.01137503,  0.03090557,  0.00468026, -0.03653241, -
0.01888979,
         0.0064856 ,  0.00778569,  0.03836148, -0.013822  ,
0.02057052,
         0.02312112, -0.02007102, -0.00953731, -0.02770751,
0.01333355,
         0.00828931, -0.00879313,  0.00221886,  0.01561391, -
0.00762261,
         0.02848349, -0.00067464,  0.00936544, -0.00152097, -
0.02330176,
         0.02708445, -0.01033216, -0.00560038,  0.00487636,
0.03679673,
         0.00241538,  0.00237701, -0.02773185,  0.0255984 ,
0.01730121]),
```

```
 array([-0.00039381,  0.00435926,  0.00827138,  0.00306275, -
0.01897363,
        -0.02668322,  0.01390896,  0.03865643, -0.04824571, -
0.01554726,
        -0.00491002, -0.01586269,  0.00268201, -0.00226036, -
0.01496862,
         0.01145377,  0.03018628, -0.0009675 , -0.03528535, -
0.02335695,
         0.00303992,  0.00984537,  0.04140475, -0.01529283,
0.01709404,
         0.02136697, -0.02017204, -0.00740778, -0.0257665 ,
0.01485052,
         0.01143436, -0.01279279,  0.00190315,  0.01410677, -0.007071
,
         0.02976502, -0.00263549,  0.00787563, -0.00351517, -
0.02573301,
         0.0239401 , -0.0091014 , -0.00379193,  0.00494599,
0.03604963,
         0.00065077,  0.00766182, -0.02691592,  0.01960409,
0.01186359]),
 array([ 0.00014582,  0.00362262,  0.00338251, -0.00143907, -
0.01892412,
        -0.02604109,  0.01744204,  0.03516006, -0.04404688, -
0.01031045,
        -0.00603266, -0.01209736,  0.00411226,  0.00106901, -
0.01966255,
         0.00729486,  0.02614349,  0.00146061, -0.03074585, -
0.01891685,
         0.0043121 ,  0.0050115 ,  0.03741003, -0.01192572,
0.01547475,
         0.02281092, -0.01871774, -0.00916175, -0.02433743,
0.01219327,
         0.00575703, -0.01148421,  0.0061256 ,  0.01066439, -
0.01361194,
         0.02509282,  0.0026815 ,  0.01014514, -0.00528928, -0.0228438
,
         0.02481762, -0.00470857,  0.00204605,  0.00329435,
0.03735619,
         0.00101129,  0.00534536, -0.02329269,  0.01774315,
0.01260039]),
 array([ 8.82418552e-04,  1.51789322e-03,  7.30927552e-03,
8.95370187e-05,
        -2.85163322e-02, -4.27089481e-02,  2.00066207e-02,
5.10224216e-02,
        -6.62543026e-02, -2.06849080e-02, -1.10862301e-02, -
2.06542118e-02,
         2.19871052e-03,  1.34915999e-03, -2.19022411e-02,
1.59382793e-02,
         3.58591899e-02,  1.71634452e-03, -4.79622829e-02, -
```

```
3.33089233e-02,
         1.10015823e-02,  1.60823170e-02,  6.06988304e-02, -
1.87382977e-02,
         2.38050666e-02,  2.77902776e-02, -2.60110484e-02, -
1.11597431e-02,
        -3.53532287e-02,  2.18870158e-02,  1.29305893e-02, -
1.92677836e-02,
         6.97842512e-04,  1.28662651e-02, -1.80399968e-02,
4.04479214e-02,
        -4.12539542e-03,  1.49043890e-02, -1.13712380e-02, -
3.48013829e-02,
         3.79645139e-02, -1.10915108e-02, -6.63800201e-03,
8.27993960e-03,
         5.10401671e-02, -5.46161106e-05,  7.86341354e-03, -
3.39730352e-02,
         2.86117334e-02,  1.95323480e-02]),
 array([ 0.00298567,  0.00454601,  0.00056476, -0.0014746 , -
0.01625749,
        -0.02084799,  0.01875527,  0.03625418, -0.0382808 , -0.0127855
,
        -0.00755712, -0.01700399,  0.00432614,  0.00389676, -
0.00860317,
         0.01049147,  0.02296477,  0.00076492, -0.02480813, -0.019695
,
         0.00183614,  0.00950576,  0.03475648, -0.00939007,  0.0134755
,
         0.01796527, -0.02017173, -0.0007398 , -0.02198537,
0.00848052,
         0.00211791, -0.01221677,  0.00387674,  0.0101479 , -
0.00832661,
         0.02568895,  0.00515663,  0.00326903, -0.00477003, -
0.02381585,
         0.02484377, -0.0051365 , -0.0053216 ,  0.00505401,
0.03363973,
        -0.00049262,  0.00562105, -0.02231557,  0.01604929,
0.01013495]),
 array([-0.00372938,  0.00185694,  0.00623052,  0.00789227, -
0.02857234,
        -0.04104893,  0.02373354,  0.05693575, -0.06867583, -0.0171615
,
        -0.01144081, -0.02574174,  0.00296568, -0.00018346, -
0.03034221,
         0.01684142,  0.04227314,  0.00017118, -0.05623516, -
0.03238999,
         0.00875448,  0.01789032,  0.05952388, -0.02303183,
0.02766861,
         0.03526026, -0.02845213, -0.01580454, -0.04314126,
0.02190046,
         0.01398181, -0.01615309,  0.00458312,  0.01891022, -
```

```
0.01837167,
         0.04224688,  0.00040276,  0.01222092, -0.00302519, -
0.03598336,
         0.04111049, -0.01678208, -0.0091386 ,  0.00581618,
0.05736723,
         0.00506186,  0.00896408, -0.04316536,  0.03487157,
0.01992652]),
 array([ 1.57495752e-03, -2.21093910e-03,  4.08760926e-03, -
2.09633186e-03,
        -1.68670026e-02, -2.44154471e-02,  1.76678386e-02,
3.45992377e-02,
        -4.36108764e-02, -1.38969173e-02, -1.18714930e-02, -
1.55026657e-02,
        -7.88376671e-04,  1.26132892e-03, -1.63695624e-02,
1.20453897e-02,
         2.59775626e-02,  1.55941710e-03, -3.28913858e-02, -
1.75942222e-02,
         3.94295382e-03,  8.19845070e-03,  3.60470178e-02, -
9.53443039e-03,
         1.33270689e-02,  1.93223099e-02, -2.17179871e-02, -
1.13478325e-02,
        -2.14605894e-02,  1.40142713e-02,  6.49973913e-03, -
6.31533057e-03,
        -1.52133114e-03,  1.14484834e-02, -1.30346313e-02,
2.50649181e-02,
        -1.13262506e-03,  9.20142399e-03, -1.68109933e-03, -
2.28197491e-02,
         2.25884261e-02, -8.33681918e-03, -1.44742088e-03,
4.94732460e-03,
         3.47392358e-02,  5.92832793e-06,  5.83733448e-03, -
2.53800402e-02,
         2.32252885e-02,  1.13140495e-02]),
 array([ 9.13326585e-04,  1.94176167e-05,  5.67684946e-03,
1.59616092e-03,
        -7.47373628e-03, -6.55548544e-03,  1.09313537e-02,
2.24420301e-02,
        -2.13559850e-02, -2.12794506e-03, -9.98996701e-03, -
1.17065867e-02,
         7.94528349e-04,  4.25871363e-03, -7.57190433e-03,
7.05432954e-03,
         2.02770804e-02,  3.56926680e-03, -1.40681487e-02, -
1.13739351e-02,
         4.53906780e-03, -3.11767210e-04,  2.08916757e-02, -
4.22767871e-03,
         4.95102976e-03,  1.66860920e-02, -1.32761142e-02, -
3.11062171e-03,
        -7.98176431e-03,  1.02280496e-02, -1.40569817e-03, -
4.76881936e-03,
         1.64990413e-03,  7.87697067e-03, -5.71568495e-03,
```

```
1.23717586e-02,
        -2.67337245e-03,  8.00331906e-03, -4.35803002e-03, -
1.51830469e-02,
         1.51803845e-02,  1.04308530e-03, -3.34551694e-03,
1.21424279e-03,
         2.09765203e-02,  3.14901440e-03,  3.59695004e-03, -
1.73254256e-02,
         4.98406819e-03,  7.46950715e-04]),
 array([ 5.01340643e-05,  2.39347798e-03,  4.95606807e-03,
6.12753139e-03,
        -2.59349940e-02, -4.55511238e-02,  2.67741351e-02,
7.17894734e-02,
        -7.73674297e-02, -1.69353155e-02, -1.06515126e-02, -
3.17006009e-02,
         1.76924844e-03,  4.77014228e-03, -2.60755500e-02,
1.99503098e-02,
         5.16760422e-02, -1.28536360e-03, -6.29011964e-02, -
4.15902061e-02,
         8.06319826e-03,  1.29398200e-02,  6.75611618e-02, -
2.02998407e-02,
         2.73746668e-02,  3.17346512e-02, -3.02754492e-02, -
8.89081617e-03,
        -5.30409269e-02,  2.49945660e-02,  1.37775631e-02, -
2.17577175e-02,
         1.67770327e-03,  2.03771336e-02, -1.87933168e-02,
5.08625536e-02,
         6.80051570e-03,  1.33432176e-02, -5.69144811e-03, -
4.08462026e-02,
         4.24166884e-02, -1.12234704e-02, -1.10395392e-02,
7.06687686e-03,
         6.34533516e-02, -9.87771054e-04,  4.10576718e-04, -
4.63479412e-02,
         3.50501939e-02,  2.24112054e-02]),
 array([-0.00082862, -0.0015216 , -0.00243283,  0.00049935, -
0.00982469,
        -0.02819962,  0.0101698 ,  0.03637716, -0.04067337, -
0.00806383,
        -0.00911512, -0.01576092, -0.0018015 , -0.00401269, -
0.02083694,
         0.00981885,  0.02882777, -0.00447055, -0.0271859 , -
0.01704533,
        -0.00306927,  0.0064776 ,  0.03421569, -0.00939516,
0.00842431,
         0.02031509, -0.01600365, -0.00335944, -0.02223962,
0.01166849,
         0.0051597 , -0.01049144, -0.00031589,  0.01190759, -
0.00379555,
         0.02420099,  0.00546749,  0.01144127, -0.0001354 , -
0.02185451,
```

```
         0.0235815 , -0.0099014 , -0.00748687,  0.0080292 ,
0.03015438,
         0.00208702,  0.00851502, -0.01886957,  0.01672608,
0.00767923]),
 array([-3.94102444e-03,  2.64854050e-03,  3.39604691e-03,
1.65923188e-03,
        -2.13896281e-02, -3.17419024e-02,  1.86968213e-02,
4.70650449e-02,
        -5.33923894e-02, -1.63856008e-02, -7.78651880e-03, -
1.75871327e-02,
         3.23249063e-03, -1.03599868e-03, -2.20315014e-02,
1.42049343e-02,
         3.76184184e-02,  1.33784939e-03, -4.20155011e-02, -
2.49672215e-02,
         3.31377150e-03,  1.05185345e-02,  4.61922142e-02, -
1.40300285e-02,
         1.97713804e-02,  2.84963937e-02, -2.59409998e-02, -
9.02667504e-03,
        -3.44007096e-02,  1.66185004e-02,  1.36570133e-02, -
1.16669275e-02,
        -6.41034556e-05,  1.70164638e-02, -9.11586697e-03,
3.66026380e-02,
         1.97615607e-03,  1.03712445e-02, -1.18398391e-03, -
2.81412277e-02,
         3.09319783e-02, -9.42391764e-03, -1.06420749e-02,
8.37979317e-03,
         4.37084892e-02,  1.95343334e-03,  6.94823335e-03, -
3.10750790e-02,
         2.83283983e-02,  1.49292608e-02]),
 array([-0.00134622,  0.00146061,  0.00561931,  0.00161374, -
0.01395876,
        -0.02325355,  0.01048319,  0.02671259, -0.03563532, -
0.00735154,
        -0.01301298, -0.01001187,  0.00207103,  0.00399398, -
0.00689911,
         0.00710755,  0.02090564,  0.00428213, -0.03018672, -0.0110336
,
        -0.00022059,  0.00293393,  0.02819618, -0.0046823 ,
0.01044202,
         0.01884544, -0.01497128, -0.00888553, -0.0241972 ,
0.00931159,
         0.0119455 , -0.00975663, -0.0011689 ,  0.01222654,
0.00263811,
         0.02042337, -0.00096278,  0.01417471, -0.00484644, -0.0162227
,
         0.01873746, -0.00575707, -0.00468067,  0.00257263,  0.0295196
,
         0.00156421,  0.00786754, -0.0208679 ,  0.01441864,
0.01549248]),
```

```
 array([-3.88856047e-04, -6.24255835e-04,  9.77974870e-04,
4.80883007e-03,
        -2.99794615e-02, -4.75777283e-02,  2.54736932e-02,
6.89020895e-02,
        -7.45979008e-02, -1.66806739e-02, -1.18935847e-02, -
2.68181820e-02,
        -8.59419308e-04,  5.01372573e-03, -3.08180139e-02,
1.87964801e-02,
         4.96116051e-02,  3.98065468e-05, -5.95215151e-02, -
3.68019974e-02,
         8.70241487e-03,  1.23578533e-02,  6.81895943e-02, -
1.77285180e-02,
         2.80643735e-02,  3.11438633e-02, -2.98036553e-02, -
9.22217551e-03,
        -5.04117205e-02,  2.09343892e-02,  1.41615628e-02, -
1.97639362e-02,
         3.16249637e-03,  1.65081762e-02, -1.68284172e-02,
4.57899582e-02,
         5.53378186e-03,  9.60756106e-03, -4.18837208e-03, -
3.80183454e-02,
         3.68130773e-02, -1.14466532e-02, -1.45563056e-02,
4.78762154e-03,
         5.84494175e-02, -9.27081315e-05,  2.10375383e-03, -
4.25616148e-02,
         3.45890540e-02,  2.42749766e-02]),
 array([ 2.86639428e-03,  1.63913509e-03,  5.23644854e-03,
2.12856291e-03,
        -1.47125906e-02, -2.64061839e-02,  1.83262883e-02,
4.07041749e-02,
        -4.65046278e-02, -7.75217440e-03, -5.80709994e-03, -
1.53541495e-02,
         5.42538566e-03,  5.21462097e-04, -1.55869728e-02,
1.22553894e-02,
         3.14091128e-02,  2.01730555e-03, -3.20738277e-02, -
2.19787604e-02,
         8.39753019e-03,  7.88607021e-03,  3.91215169e-02, -
1.05302261e-02,
         1.96009503e-02,  2.37947168e-02, -2.30007384e-02, -
5.75635110e-03,
        -2.88320711e-02,  1.25053448e-02,  7.31577497e-03, -
6.23167171e-03,
         1.67910753e-03,  1.17942301e-02, -1.08337832e-02,
2.75635067e-02,
        -1.68344238e-03,  6.95295109e-03, -7.67767629e-03, -
2.21647959e-02,
         2.61363327e-02, -8.46217568e-03, -9.65001539e-03,
3.46889744e-03,
         3.55904260e-02, -5.56141201e-05,  3.79582877e-03, -
2.55259917e-02,
```

```
         1.90205906e-02,  9.78799817e-03]),
 array([-0.00139804,  0.00021669,  0.00650049,  0.00256381, -
0.01697063,
        -0.02243046,  0.01763433,  0.03917951, -0.04681263, -
0.01151955,
        -0.0093208 , -0.01945735,  0.00386997, -0.00216238, -
0.01302859,
         0.00923794,  0.02411903, -0.00366758, -0.03350885, -
0.02459803,
         0.0050796 ,  0.01206046,  0.03708946, -0.0092173 ,
0.01831511,
         0.01802318, -0.02460901, -0.01099926, -0.03143511,
0.00595686,
         0.00915327, -0.01354326,  0.00209065,  0.00748958, -
0.01185335,
         0.02952042,  0.00096457,  0.00906693, -0.00581444, -
0.02399587,
         0.02657549, -0.01293647, -0.0034819 ,  0.00630407,
0.03461164,
         0.00283736,  0.00404032, -0.02879548,  0.01501377,
0.01777357]),
 array([ 9.54006612e-05,  1.18740516e-03,  9.69991696e-03,
4.14352052e-03,
        -2.81096356e-02, -3.66733535e-02,  2.27167137e-02,
5.03169211e-02,
        -6.84766229e-02, -1.76069170e-02, -8.70468222e-03, -
2.52099506e-02,
         4.80522607e-03,  2.24084329e-03, -3.02245492e-02,
1.56554815e-02,
         4.08398002e-02,  7.66956067e-03, -4.83643776e-02, -
3.34781244e-02,
         7.09850487e-03,  1.70683488e-02,  5.89541928e-02, -
1.75887779e-02,
         2.20227999e-02,  3.43911773e-02, -2.77950018e-02, -
1.20063482e-02,
        -3.39920428e-02,  1.52361895e-02,  1.04268893e-02, -
1.69237231e-02,
         1.36147347e-03,  1.77298370e-02, -2.05912734e-02,
3.76294145e-02,
         2.03019608e-03,  9.85990140e-03, -6.53565947e-03, -
3.41654137e-02,
         3.92835927e-02, -1.53322754e-02, -4.17325924e-03,
6.05889223e-03,
         5.73004579e-02,  6.03089100e-03,  6.00754822e-03, -
4.00824388e-02,
         3.00255878e-02,  1.83298531e-02]),
 array([ 0.00636311,  0.00486734,  0.00132304, -0.00257681, -
0.02100802,
        -0.03366813,  0.02079905,  0.04518984, -0.05161083, -
```

```
0.01502335,
        -0.0074061 , -0.02016797,  0.00158409,  0.0009443 , -
0.02064745,
         0.01390235,  0.03667345,  0.00341003, -0.03608697, -
0.02598435,
         0.00268561,  0.00496619,  0.04712461, -0.01500891,
0.01922511,
         0.02316093, -0.02097713, -0.0127882 , -0.02845154,
0.01531482,
         0.01153504, -0.01377854,  0.00121497,  0.00990362, -
0.00834814,
         0.03212475,  0.00159477,  0.01303818, -0.00415415, -
0.02999009,
         0.03465429, -0.01179334, -0.00914022,  0.00431864,
0.04293068,
         0.00522956,  0.00502033, -0.03142193,  0.02366762,
0.01748427]),
 array([-0.00388613,  0.00035033,  0.00323166, -0.00035525, -
0.01556074,
        -0.02058418,  0.01166431,  0.03676659, -0.03970349, -
0.01131045,
        -0.01109371, -0.01293867,  0.00201637,  0.00396842, -
0.01790748,
         0.01227065,  0.0280576 , -0.00079141, -0.03150335, -
0.02040091,
         0.00308258,  0.0072918 ,  0.03795157, -0.01595257,
0.01555456,
         0.02046198, -0.01777291, -0.00391347, -0.0245814 ,
0.01647643,
         0.00483185, -0.01191568, -0.00167719,  0.0154492 , -0.0159574
,
         0.02875851,  0.00054288,  0.00935676, -0.00286564, -
0.02151252,
         0.02577351, -0.00670564, -0.00380528,  0.00236828,  0.0367346
,
         0.00677794,  0.00426327, -0.03168692,  0.02062164,
0.00857659]),
 array([ 0.00198277, -0.00098878,  0.00532899, -0.00289294, -0.0199637
,
        -0.03025288,  0.01378203,  0.03653408, -0.04253708, -
0.00965148,
        -0.00830197, -0.01296598,  0.00296669, -0.00073537, -
0.02138362,
         0.01065767,  0.03081748,  0.00026412, -0.03726257, -
0.01941811,
         0.00104684,  0.00594459,  0.03938584, -0.01730812,
0.01977225,
         0.01936655, -0.02172057, -0.00895576, -0.02509952,
0.00978276,
```

```
         0.00727085, -0.01023839, -0.0025739 ,  0.00985177, -
0.01235148,
         0.02531113,  0.00374957,  0.00818636, -0.0004277 , -
0.02643158,
         0.02489257, -0.01066206, -0.00163237,  0.00542141,
0.03540567,
         0.0017412 ,  0.00492817, -0.02971125,  0.02325509,
0.01305359]),
 array([-0.00155511,  0.00418943,  0.00333592,  0.00288058, -
0.02480001,
        -0.03632182,  0.02187536,  0.05056902, -0.06004413, -
0.01613767,
        -0.01050635, -0.02214981,  0.00299174,  0.001051  , -
0.02289309,
         0.01715147,  0.04257538,  0.00076785, -0.04883238, -
0.03225743,
         0.00397866,  0.01054107,  0.05363902, -0.0153982 ,
0.02216118,
         0.02754428, -0.02654055, -0.01253196, -0.03750696,
0.01690334,
         0.01284474, -0.01550271,  0.00106421,  0.01707598, -
0.01332524,
         0.0399468 ,  0.00464293,  0.01391502, -0.00360356, -
0.03327091,
         0.03644423, -0.01067402, -0.0124147 ,  0.00757414,
0.04965704,
         0.00263379,  0.00961296, -0.0349325 ,  0.02706397,
0.02056346]),
 array([ 0.00101646,  0.00528719,  0.00336522, -0.0002213 , -
0.02011293,
        -0.0289305 ,  0.01710198,  0.03867756, -0.04991244, -
0.01094742,
        -0.00445993, -0.01840093,  0.00094167,  0.00088745, -
0.01905769,
         0.01106087,  0.03051498,  0.0005634 , -0.03799728, -
0.02277317,
         0.00431469,  0.00760461,  0.04128941, -0.01401324,
0.01431202,
         0.02487565, -0.02293968, -0.01166563, -0.02938778,
0.01444654,
         0.00813747, -0.01233432,  0.00276675,  0.01191681, -
0.00881791,
         0.0294599 , -0.00075763,  0.00962984, -0.00372078, -
0.02516694,
         0.02561934, -0.00884566, -0.00084651,  0.00397318,
0.03988196,
         0.0026278 ,  0.00744897, -0.02910087,  0.0235978 ,
0.01437313]),
 array([-0.00253112, -0.00061172,  0.00406785,  0.00620245, -
```

```
0.01838403,
        -0.03184169,  0.02215799,  0.0490804 , -0.06110373, -
0.01332491,
        -0.013743  , -0.01928455, -0.00026262,  0.00037988, -
0.02549458,
         0.01541222,  0.03885821,  0.00088936, -0.04322831, -
0.02897569,
         0.00835086,  0.01153694,  0.05239325, -0.01786438,
0.02048459,
         0.02628559, -0.02223287, -0.01182275, -0.03310243,
0.01503471,
         0.01203782, -0.0136967 ,  0.00289108,  0.01862107, -
0.01381479,
         0.03662542, -0.00088501,  0.01264748, -0.00435396, -
0.02974018,
         0.0348284 , -0.01022488, -0.01107206,  0.00421947,
0.04831983,
         0.00322524,  0.0068451 , -0.03546049,  0.0302936 ,
0.01755732]),
 array([ 1.01395907e-03,  1.65330261e-03,  1.98222051e-03, -
2.75037834e-03,
        -1.33999369e-02, -1.91833868e-02,  8.78164954e-03,
2.61667402e-02,
        -3.20714231e-02, -6.82618133e-03, -2.78955506e-03, -
1.15318092e-02,
         1.74642121e-03, -5.53177891e-06, -1.31607934e-02,
1.21822423e-02,
         1.85842941e-02,  1.33795741e-03, -2.00910794e-02, -
1.35363454e-02,
         2.92486424e-04,  6.52155578e-03,  2.49264874e-02, -
6.19083616e-03,
         9.83714845e-03,  1.42887034e-02, -1.59139459e-02, -
3.88678996e-03,
        -1.61832561e-02,  8.32404820e-03,  6.83847584e-03, -
1.90884237e-03,
         3.21057939e-03,  8.80362360e-03, -8.31887392e-03,
1.88175374e-02,
         3.12051105e-03,  5.98664821e-03, -4.16503788e-03, -
1.38000677e-02,
         1.56187065e-02, -8.00234682e-03, -8.59308276e-04,
1.17124318e-03,
         2.16434206e-02,  6.34519203e-03,  2.22447150e-03, -
1.42443780e-02,
         1.13301877e-02,  1.06385053e-02]),
 array([ 3.08879137e-03,  2.82014304e-03,  1.18791922e-03, -
3.71748472e-05,
        -1.89845783e-02, -2.57751885e-02,  2.04658147e-02,
4.10077270e-02,
        -4.39824275e-02, -1.07232393e-02, -8.22090897e-03, -
```

```
1.74415972e-02,
         3.28193725e-03,  3.33236552e-03, -2.11366257e-02,
1.41150721e-02,
         2.84876177e-02,  1.27699707e-03, -3.36663726e-02, -
2.31300499e-02,
         4.16755003e-03,  5.50056430e-03,  4.30264878e-02, -
1.20860576e-02,
         1.75487612e-02,  2.02239131e-02, -2.03023270e-02, -
1.21156906e-02,
        -2.81052653e-02,  1.11382982e-02,  9.04819632e-03, -
1.13655589e-02,
         1.24332424e-03,  8.28415984e-03, -9.55848543e-03,
2.85220404e-02,
        -1.19490815e-03,  1.03621042e-02, -6.03195283e-03, -
2.79941152e-02,
         2.50525072e-02, -9.40993587e-03, -6.65750071e-03,
2.45590738e-03,
         3.80256906e-02,  3.83859370e-03,  4.85828483e-03, -
3.00106464e-02,
         1.95358651e-02,  1.65974248e-02]),
 array([-0.0003828 ,  0.0067891 ,  0.0032222 ,  0.00421389, -0.0189213
,
        -0.03436363,  0.02505192,  0.04804112, -0.05134335, -
0.01683667,
        -0.00476138, -0.01772911, -0.00073428, -0.00285617, -
0.02545758,
         0.01431093,  0.03229864,  0.00266114, -0.04641323, -
0.02565725,
        -0.00305371,  0.0074205 ,  0.04816378, -0.01644091,
0.01937872,
         0.0208077 , -0.02679292, -0.00898385, -0.0355948 ,
0.01679701,
         0.00967235, -0.00874939, -0.0034283 ,  0.01441132, -
0.01116228,
         0.03516158,  0.00455392,  0.00916161, -0.00120673, -
0.02380508,
         0.02971515, -0.01074256, -0.00254348,  0.00715726,
0.04261329,
         0.0058249 ,  0.00433842, -0.03220364,  0.02997312,
0.01332943]),
 array([ 0.00018543, -0.00244574, -0.00141604,  0.00031184, -0.0186126
,
        -0.02411762,  0.01447766,  0.03329361, -0.04378183, -
0.01832566,
        -0.00613414, -0.01717343,  0.00551149,  0.00195192, -0.013743
,
         0.00800681,  0.02419679,  0.00140553, -0.03229034, -
0.01988629,
         0.00783668,  0.01157286,  0.03265072, -0.01080896,
0.01429439,
```

```
         0.02013424, -0.01936246, -0.00699771, -0.02176837,
0.01119367,
         0.00553593, -0.00850313, -0.00483   ,  0.0070726 , -
0.01362689,
         0.02690213, -0.0030511 ,  0.00611961, -0.00179541, -
0.02314891,
         0.02484507, -0.00724374, -0.00404859,  0.00085529,
0.03688828,
         0.00254526,  0.00520711, -0.02516609,  0.02203449,
0.01122831]),
 array([ 0.00255355,  0.00247561,  0.00762088, -0.00142526, -
0.02226149,
        -0.03269689,  0.01456367,  0.04512135, -0.05803745, -
0.01520771,
        -0.00833132, -0.01788119,  0.00403383, -0.00094716, -
0.02447377,
         0.01420928,  0.03450113,  0.00564723, -0.04462147, -0.0242695
,
         0.00770018,  0.0128748 ,  0.04891096, -0.01636571,
0.01825719,
         0.02587955, -0.02486453, -0.00869865, -0.02757424,
0.01442466,
         0.00629768, -0.01906962,  0.00713832,  0.01332589, -
0.01388446,
         0.03192925,  0.00225391,  0.00972703, -0.00807786, -
0.02834975,
         0.03161139, -0.01627861, -0.00609729,  0.00827908,
0.04368681,
        -0.00141194,  0.0084895 , -0.03407879,  0.02412885,
0.01770095]),
 array([-0.00138362,  0.00149098,  0.00626151,  0.001783  , -
0.02515973,
        -0.03485863,  0.01914829,  0.0469531 , -0.0603326 , -
0.01618983,
        -0.00968724, -0.02038096,  0.00233364,  0.00067641, -0.0255906
,
         0.01408725,  0.03732478,  0.00571027, -0.04473573, -
0.02864938,
         0.00422308,  0.01302943,  0.05317445, -0.01886465,
0.02329071,
         0.02889061, -0.02411641, -0.01097102, -0.03286309,
0.01531115,
         0.01006367, -0.01675444,  0.00286227,  0.01804745, -
0.01728511,
         0.03715214, -0.00035315,  0.00842595, -0.00685734, -
0.03159237,
         0.03693778, -0.01494954, -0.00514575,  0.00432412,
0.05012204,
         0.00418051,  0.00579978, -0.03500141,  0.02685199,
```

```
0.01571372]),
 array([ 0.00268529,  0.0037414 ,  0.00119695,  0.00118534, -
0.01354195,
        -0.01429253,  0.00970116,  0.02857372, -0.03239127, -
0.00527029,
        -0.00421292, -0.00658864,  0.00269917,  0.00634812, -
0.01051413,
         0.00447288,  0.01830675,  0.00111667, -0.02271118, -
0.01543674,
         0.00611011,  0.00156854,  0.02724542, -0.01183099,
0.00969509,
         0.01398497, -0.01722682, -0.00380252, -0.0142711 ,
0.00735646,
         0.00722497, -0.00825254,  0.00221349,  0.0090118 , -
0.00154077,
         0.01569242, -0.00204841,  0.00738232, -0.00858678, -
0.01578823,
         0.02191912, -0.00462527, -0.00493937,  0.00725544,  0.0220844
,
        -0.00396063,  0.00478941, -0.01425656,  0.00750813,  0.008155
]),
 array([ 0.00067111, -0.00147664,  0.0087918 ,  0.00394691, -
0.03053306,
        -0.03946231,  0.02366758,  0.05426123, -0.0726453 , -
0.01962471,
        -0.01086886, -0.02597642,  0.00492601,  0.00179002, -
0.03486912,
         0.01765209,  0.04242016,  0.00972324, -0.05321225, -0.0356292
,
         0.00605973,  0.01992929,  0.06264754, -0.02074261,
0.02616104,
         0.03716325, -0.0312785 , -0.01282228, -0.04049203,  0.0154988
,
         0.01059654, -0.02103241,  0.00338269,  0.02132874, -
0.02293504,
         0.04396049,  0.00143835,  0.00614367, -0.01014571, -
0.03573603,
         0.04397665, -0.01817689, -0.00519356,  0.00757259,
0.06520651,
         0.00814822,  0.0057868 , -0.04481759,  0.03089064,
0.01849668]),
 array([ 0.00329159, -0.00131628, -0.001005  , -0.00329488, -
0.00950609,
        -0.01114174,  0.00609428,  0.01748757, -0.01658758, -
0.00119574,
        -0.00566066, -0.00422046,  0.00386307, -0.00280782, -
0.01303017,
         0.00373067,  0.00797371, -0.00189975, -0.01254288, -
0.00825648,
```

```
         0.00082114,  0.00230214,  0.02049587, -0.00031516,
0.00796403,
         0.01180049, -0.01348279, -0.00155085, -0.01265986,
0.00246098,
         0.0011781 , -0.00720424, -0.00108423, -0.00064325, -
0.00194588,
         0.01675915,  0.00167102,  0.00403849,  0.00378159, -
0.01738045,
         0.01008221, -0.00577673, -0.00209481, -0.00040979,
0.02020701,
         0.0005554 ,  0.00333715, -0.00977492,  0.00738634,
0.00441038]),
 array([-0.00074246,  0.0023525 ,  0.0044806 ,  0.00282089, -
0.02070343,
        -0.03180205,  0.01813022,  0.04361783, -0.05349536, -
0.01189627,
        -0.00919938, -0.0179539 ,  0.00095385, -0.00075025, -
0.02151242,
         0.01289876,  0.03239448,  0.00300275, -0.04118912, -
0.02696891,
         0.00366486,  0.01156307,  0.0479554 , -0.01700705,
0.01873802,
         0.02420006, -0.02305451, -0.01186686, -0.02826958,
0.01525148,
         0.00940988, -0.01754809,  0.00365931,  0.01660949, -
0.01134279,
         0.03623994, -0.00127491,  0.00783293, -0.0027542 , -
0.02754485,
         0.03021031, -0.01221709, -0.0055209 ,  0.005376  ,
0.04320387,
         0.00358353,  0.00567308, -0.03304394,  0.02501939,
0.01502112]),
 array([-0.00257147, -0.00265948,  0.00168854,  0.00038893, -0.0164479
,
        -0.01652948,  0.00970677,  0.0221372 , -0.02583754, -
0.00807385,
        -0.00300913, -0.01467068,  0.00150045, -0.0004835 , -
0.01383608,
         0.00525328,  0.02042955,  0.00067203, -0.02991987, -
0.01698786,
         0.00065935,  0.00939235,  0.02884332, -0.00834614,
0.01136423,
         0.01994032, -0.01830421, -0.00145656, -0.01897252,
0.01067657,
         0.00749703, -0.01328859, -0.00221391,  0.00838869, -0.0107033
,
         0.01723434, -0.00063271,  0.00558447, -0.00145637, -
0.01591253,
         0.01763339, -0.00406844,  0.00026934, -0.00208613,
```

```
0.02980934,
         0.00107112,  0.00313891, -0.0165621 ,  0.01574423,
0.00745958]),
 array([-1.53058960e-03,  1.37436212e-03,  3.00855960e-03, -
2.71898095e-03,
        -1.36681648e-02, -1.19826702e-02,  1.09724244e-02,
2.85483345e-02,
        -3.35499899e-02, -7.27688856e-03, -7.24188148e-03, -
9.23987653e-03,
         9.70714429e-05,  9.45364457e-04, -1.23233998e-02,
1.33627216e-02,
         2.00592564e-02,  3.69653917e-03, -1.38364528e-02, -
1.30256349e-02,
         8.27863706e-04,  3.85415867e-03,  3.02430112e-02, -
4.75468279e-03,
         9.30943563e-03,  1.56603690e-02, -1.88905442e-02, -
8.55870009e-03,
        -1.22390429e-02,  8.55014335e-03,  4.00163645e-03, -
7.61162009e-03,
        -1.54821300e-03,  1.19556499e-02, -5.81347751e-03,
1.91278676e-02,
         1.71291089e-03,  5.28953827e-03, -1.26598429e-03, -
1.18042110e-02,
         2.23003494e-02, -2.32861988e-03, -6.45324775e-03,
3.62771959e-03,
         2.46533182e-02,  8.40787413e-04,  1.20747557e-03, -
2.00338979e-02,
         1.32638742e-02,  7.13437439e-03]),
 array([-3.98958764e-03,  2.47139863e-03, -2.66262893e-05,
4.98192507e-04,
        -1.48668496e-02, -2.08261365e-02,  1.07263110e-02,
2.77518950e-02,
        -3.35405525e-02, -6.93524402e-03, -3.14132179e-03, -
7.80206032e-03,
         2.73448578e-03,  2.02519708e-03, -9.96225838e-03,
8.27397276e-03,
         2.66490062e-02, -4.48666899e-04, -2.51564578e-02, -
1.81001701e-02,
         1.86385215e-03,  4.39999127e-03,  2.84737842e-02, -
1.08512552e-02,
         1.66447753e-02,  2.09606858e-02, -1.82334868e-02, -
2.21796082e-03,
        -1.90616603e-02,  8.14407260e-03,  8.68579193e-03, -
8.98145627e-03,
         4.86546335e-03,  9.23998282e-03, -9.33298893e-03,
1.89038833e-02,
        -1.67509504e-03,  1.03968023e-02, -1.78576935e-03, -
2.31946151e-02,
         2.47224440e-02, -9.17026733e-04, -5.53252172e-03, -
```

```
2.35832080e-03,
         3.16874663e-02, -1.63949848e-03,  7.26107915e-03, -
2.69966741e-02,
         1.50110803e-02,  1.30216708e-02]),
 array([-0.00280596,  0.00147303,  0.00720631,  0.00631161, -0.0275928
,
        -0.03567223,  0.01979058,  0.05300925, -0.06515613, -
0.01719979,
        -0.00911051, -0.02501788,  0.00340533,  0.00015871, -
0.02672065,
         0.01582803,  0.03868827,  0.00164229, -0.05053516, -
0.02986066,
         0.00784086,  0.01473511,  0.05633956, -0.02106938,
0.02280624,
         0.03179953, -0.02524991, -0.01415612, -0.03704602,
0.02020422,
         0.01384028, -0.01709704,  0.00435062,  0.01751161, -
0.01552041,
         0.03690298, -0.0005133 ,  0.0107898 , -0.00382137, -0.0312856
,
         0.03869303, -0.01350276, -0.00899187,  0.00655472,
0.05121722,
         0.0037664 ,  0.00834851, -0.03995989,  0.03142086,
0.01877569]),
 array([ 0.00014502,  0.00495789,  0.00267618,  0.00156926, -
0.01610758,
        -0.02769335,  0.01333357,  0.03784979, -0.04160796, -
0.01313193,
        -0.00665696, -0.0124804 ,  0.00464603, -0.00142197, -
0.01797985,
         0.0059994 ,  0.02844436,  0.00245168, -0.03285082, -
0.02206306,
         0.00591196,  0.00574957,  0.03356441, -0.01672328,  0.0159345
,
         0.01772035, -0.01938339, -0.00690512, -0.02216715,
0.01587709,
         0.00738447, -0.01174101,  0.00026037,  0.01263166, -
0.00866009,
         0.02542324, -0.00421164,  0.00781641, -0.00432944, -
0.02370567,
         0.02626789, -0.0100808 , -0.00368666,  0.00419395,
0.03318523,
        -0.00065442,  0.00486625, -0.02558409,  0.02136271,
0.01088855]),
 array([ 0.00125804,  0.00356976,  0.00513554,  0.00276802, -
0.01604637,
        -0.02074624,  0.01208392,  0.02934336, -0.03529192, -
0.00740562,
        -0.00711368, -0.01315014,  0.00052458, -0.00085577, -
```

```
0.01303676,
         0.00915019,  0.02255069, -0.00046809, -0.02770916, -
0.01603231,
         0.00237086,  0.00585323,  0.03099267, -0.01195437,  0.0118999
,
         0.01518656, -0.0171783 , -0.00524668, -0.02127202,
0.01112798,
         0.00750888, -0.01034372, -0.00011937,  0.00833508, -
0.00796537,
         0.02412221,  0.00077771,  0.00681943, -0.00355116, -
0.01842006,
         0.0208309 , -0.00820968, -0.00338058,  0.00293913,
0.02685671,
        -0.00047268,  0.00699561, -0.02228449,  0.0184565 ,  0.0106634
]),
 array([-0.00244559,  0.00147194,  0.006224  ,  0.00296736, -
0.01284087,
        -0.02442165,  0.01307688,  0.02998264, -0.03445587, -
0.00844701,
        -0.00810495, -0.01523914,  0.00216736,  0.00344616, -
0.01811927,
         0.01188401,  0.02217506,  0.00120849, -0.03076833, -
0.01644988,
         0.00014846,  0.00421377,  0.02926431, -0.01404889,
0.01437451,
         0.01706768, -0.02126415, -0.00424255, -0.02253611,
0.01067964,
         0.01167039, -0.00911045,  0.00068298,  0.01040869, -
0.01241251,
         0.01857494,  0.00060713,  0.00784847, -0.00457736, -
0.02086126,
         0.01954824, -0.00930539, -0.00358563,  0.00134439,
0.02687917,
         0.00568326, -0.00128244, -0.02335322,  0.01901812,
0.01289308]),
 array([ 2.38118437e-03,  2.84529613e-03,  1.02284161e-03,
1.57608545e-03,
        -1.28670287e-02, -1.85648396e-02,  1.09704842e-02,
3.00875668e-02,
        -3.33260003e-02, -1.02741199e-02, -3.88661588e-03, -
1.19675784e-02,
         7.27716673e-04,  2.55631770e-03, -1.35681168e-02,
6.77427222e-03,
         1.84596617e-02, -1.60833850e-03, -2.92849688e-02, -
1.78412199e-02,
         3.69640587e-03,  3.61182924e-03,  3.16745024e-02, -
9.77882225e-03,
         1.17480431e-02,  1.93982354e-02, -1.33653718e-02, -
8.78752787e-03,
```

```
        -1.96023142e-02,  1.12501006e-02,  6.81018559e-03, -
9.39332095e-03,
         2.21080695e-05,  1.20568030e-02, -1.27626402e-02,
1.69388642e-02,
         2.58742410e-03,  8.12757435e-03, -4.62497873e-04, -
1.51237800e-02,
         2.12071946e-02, -4.00822046e-03, -3.59159115e-03,
6.30964906e-04,
         2.73312082e-02,  3.90119381e-03,  4.42185071e-03, -
1.96091159e-02,
         1.77727498e-02,  1.31508036e-02]),
 array([ 0.00307243, -0.00125575,  0.00083336,  0.00429597, -
0.01605623,
        -0.02251692,  0.01303113,  0.03150333, -0.03534882, -
0.00399434,
        -0.00624427, -0.01535103,  0.00455167,  0.00130244, -
0.01443899,
         0.00705611,  0.02423756, -0.00030926, -0.02970164, -
0.01717824,
         0.00315152,  0.00757269,  0.02916433, -0.01295331,
0.00947851,
         0.0149669 , -0.01719425, -0.00482822, -0.02293006,
0.01080299,
         0.00496403, -0.01161681, -0.00076487,  0.00845997, -
0.00886121,
         0.02224849,  0.0036231 ,  0.00952556, -0.00073392, -
0.01808857,
         0.01958036, -0.00510761, -0.00723898,  0.00251785,
0.02733697,
         0.0022489 ,  0.00988268, -0.0220107 ,  0.01857009,
0.01254963]),
 array([-0.00197929,  0.00012137,  0.00248886,  0.00483591, -0.0226512
,
        -0.03494857,  0.02062267,  0.05537348, -0.05996218, -
0.01435045,
        -0.0095826 , -0.02139736,  0.0002392 ,  0.00124515, -
0.02237973,
         0.01608018,  0.03980023, -0.00026693, -0.04885632, -
0.03054984,
         0.00631747,  0.00946731,  0.05297456, -0.01455367,
0.02156017,
         0.02661534, -0.0245748 , -0.00681208, -0.03785396,
0.01815882,
         0.01352565, -0.0158373 ,  0.00293782,  0.01434951, -
0.01437647,
         0.03765596,  0.00270131,  0.00871828, -0.00501766, -0.0293588
,
         0.03241821, -0.00990951, -0.01067641,  0.00390317,
0.04843682,
```

```
        -0.00241211,  0.00199818, -0.03666292,  0.02732322,  0.0197566
]),
 array([-1.56481316e-03,  3.44648049e-04,  2.83799736e-03,
2.82184260e-03,
        -1.85448113e-02, -2.91777243e-02,  2.00364939e-02,
4.20259673e-02,
        -5.17341546e-02, -8.91433111e-03, -1.21378845e-02, -
2.02471950e-02,
         2.08259333e-03,  1.40871849e-03, -2.30714037e-02,
1.29277089e-02,
         3.20510022e-02,  8.36091294e-04, -4.27428061e-02, -
2.36572398e-02,
         9.52216383e-03,  1.23655300e-02,  4.31799609e-02, -
1.70435746e-02,
         2.09585806e-02,  2.46115186e-02, -1.97565981e-02, -
7.21147083e-03,
        -3.27887941e-02,  1.45705065e-02,  1.06802438e-02, -
1.30137846e-02,
         1.82342205e-03,  1.44762439e-02, -1.28542379e-02,
2.89794401e-02,
         3.23387728e-03,  8.59305463e-03,  4.35436282e-05, -
2.57488125e-02,
         2.91728360e-02, -1.02511110e-02, -6.99994035e-03,
3.91191729e-03,
         4.13861149e-02,  3.81425446e-03,  6.62358256e-03, -
2.52458692e-02,
         2.64707098e-02,  1.31868459e-02]),
 array([-0.00185938,  0.00180476,  0.00668643,  0.00401084, -
0.02673757,
        -0.03382114,  0.02168216,  0.04794533, -0.05792428, -
0.01701697,
        -0.01060437, -0.019662  ,  0.00483392, -0.00091877, -
0.02556664,
         0.01275765,  0.03511633,  0.00332912, -0.04508449, -
0.02614051,
         0.00444227,  0.01503256,  0.05080988, -0.01586284,  0.0201918
,
         0.02994009, -0.02482898, -0.01041522, -0.03135653,
0.01877015,
         0.01041336, -0.01676897,  0.0021958 ,  0.01743361, -
0.01654856,
         0.03582329, -0.00176834,  0.0074676 , -0.00441681, -0.0293745
,
         0.03376892, -0.01163574, -0.00519827,  0.00609903,
0.04918603,
         0.00343556,  0.00978743, -0.036463  ,  0.02884744,
0.01645451]),
 array([ 0.00333461,  0.00349877,  0.00153572, -0.001312  , -
0.01615731,
```

```
        -0.02447273,  0.01005874,  0.03058382, -0.03961235, -
0.00951806,
        -0.00402463, -0.01495747,  0.0016687 ,  0.00046953, -
0.01241869,
         0.00855175,  0.02719093, -0.00051574, -0.02978416, -
0.01677508,
         0.0034456 ,  0.0059505 ,  0.03616876, -0.01195656,
0.01022839,
         0.01660569, -0.01662412, -0.00478181, -0.02271852,
0.01303376,
         0.00651612, -0.01308237,  0.00106465,  0.00930369, -
0.00881611,
         0.02526814, -0.00048507,  0.00478099, -0.00385319, -
0.02067533,
         0.01731819, -0.00570217, -0.00409437,  0.00497457,
0.02733144,
        -0.00122665,  0.0044913 , -0.02440268,  0.01883276,
0.01133085]),
 array([-0.00118708,  0.00135644, -0.00071212,  0.00307939, -
0.01398059,
        -0.02536876,  0.01218742,  0.03441247, -0.03605403, -
0.00719275,
        -0.00476824, -0.01280956, -0.00066327, -0.0002944 , -
0.01167176,
         0.00619006,  0.01954481, -0.00562038, -0.0307651 , -
0.01390813,
         0.00192404,  0.00883696,  0.03139499, -0.01214641,
0.01470436,
         0.01023403, -0.01787084, -0.0111091 , -0.01858225,
0.01035138,
         0.00188008, -0.00502667, -0.00254515,  0.00616821, -
0.00816881,
         0.02087361,  0.00186478,  0.01165131, -0.01049008, -
0.01924297,
         0.01850559, -0.00581685, -0.00469764,  0.00611712,
0.03488859,
         0.00491191,  0.00570299, -0.01947652,  0.01862204,
0.00871389]),
 array([-0.00280596,  0.00147303,  0.00720631,  0.00631161, -0.0275928
,
        -0.03567223,  0.01979058,  0.05300925, -0.06515613, -
0.01719979,
        -0.00911051, -0.02501788,  0.00340533,  0.00015871, -
0.02672065,
         0.01582803,  0.03868827,  0.00164229, -0.05053516, -
0.02986066,
         0.00784086,  0.01473511,  0.05633956, -0.02106938,
0.02280624,
         0.03179953, -0.02524991, -0.01415612, -0.03704602,
```

```
0.02020422,
         0.01384028, -0.01709704,  0.00435062,  0.01751161, -
0.01552041,
         0.03690298, -0.0005133 ,  0.0107898 , -0.00382137, -0.0312856
,
         0.03869303, -0.01350276, -0.00899187,  0.00655472,
0.05121722,
         0.0037664 ,  0.00834851, -0.03995989,  0.03142086,
0.01877569]),
 array([-5.04196577e-04, -1.11196678e-03,  9.37966870e-05,
5.63919988e-03,
        -2.62883645e-02, -3.85909781e-02,  2.31257487e-02,
5.87741809e-02,
        -6.71028859e-02, -1.47587111e-02, -9.66307680e-03, -
2.72114020e-02,
        -1.44931921e-03,  5.04354214e-03, -2.52451244e-02,
1.80796641e-02,
         4.46027819e-02, -3.44568950e-03, -5.19598284e-02, -
3.58844802e-02,
         5.82886889e-03,  1.21351408e-02,  6.06995876e-02, -
1.88327520e-02,
         2.63269051e-02,  2.75860474e-02, -2.69068821e-02, -
6.64270938e-03,
        -4.61966897e-02,  2.11835973e-02,  1.46124374e-02, -
1.89878726e-02,
         4.92974618e-03,  1.59245514e-02, -1.58955199e-02,
3.92439956e-02,
         3.98371262e-03,  9.85162425e-03, -6.20490544e-03, -
3.50512553e-02,
         3.26101621e-02, -1.01527751e-02, -1.34432998e-02,
4.07999896e-03,
         5.40524199e-02, -7.44521332e-04,  1.50279153e-03, -
4.00719498e-02,
         3.24120401e-02,  2.31848032e-02]),
 array([-0.00261936, -0.00157256,  0.00353811,  0.0041453 , -
0.01378541,
        -0.01606356,  0.00809811,  0.02240402, -0.03047871, -0.0112833
,
        -0.00214817, -0.01547127,  0.00477357,  0.00134196, -
0.01754192,
         0.00521859,  0.02235033, -0.00274055, -0.01931664, -
0.01081335,
         0.00085771,  0.00303557,  0.02184913, -0.00767294,
0.01017844,
         0.01587868, -0.01020939, -0.00675914, -0.01889118,
0.00859987,
         0.00911554, -0.00415619, -0.00705011,  0.01140978, -
0.00908796,
         0.01596975,  0.00047679,  0.00020981, -0.00535331, -
```

```
0.01417908,
         0.01284095, -0.00936561, -0.00270194,  0.001222  ,
0.02541776,
        -0.00197613,  0.00084599, -0.02247876,  0.00896575,
0.00563362]),
 array([ 0.00058464, -0.00039591, -0.0024266 ,  0.00198123, -
0.01692623,
        -0.02228038,  0.01083116,  0.02932406, -0.03512637, -0.0114881
,
        -0.00901431, -0.01920437,  0.0001351 ,  0.00276431, -
0.01706911,
         0.00776098,  0.02369692, -0.00400843, -0.03029936, -
0.01783893,
         0.00098261,  0.00613569,  0.03203983, -0.00974206,  0.0118004
,
         0.01326237, -0.01759175, -0.00307724, -0.02169512,
0.01208659,
         0.00578882, -0.01018736, -0.00137527,  0.01239275, -
0.01003755,
         0.02072781, -0.00135237,  0.00810642, -0.00210279, -
0.02518928,
         0.02089476, -0.0058774 , -0.00181871,  0.00152129,  0.0289847
,
         0.00155559,  0.0030063 , -0.02596348,  0.01646093,
0.00740934]),
 array([ 0.00171347,  0.00101424,  0.00973737,  0.00158951, -
0.02570841,
        -0.03698637,  0.02040236,  0.04800096, -0.06197126, -
0.01664396,
        -0.00947052, -0.02220809,  0.00344578,  0.00050159, -
0.02641294,
         0.01665756,  0.03745581,  0.00608316, -0.04887032, -
0.02803386,
         0.00343425,  0.01227841,  0.05317608, -0.02051952,
0.02107327,
         0.03023029, -0.02808402, -0.0102696 , -0.03429792,
0.01557121,
         0.01168152, -0.017049  ,  0.00285593,  0.0176768 , -
0.01692156,
         0.03529751,  0.00035905,  0.00616674, -0.00676627, -
0.03385297,
         0.0348835 , -0.01429314, -0.003292  ,  0.00450472,
0.05435224,
         0.00421377,  0.0047697 , -0.03781207,  0.03077894,
0.01822506]),
 array([-0.00013607, -0.00040024,  0.0004767 ,  0.00115529, -
0.01789416,
        -0.02976559,  0.01583804,  0.03864313, -0.04365044, -0.0089819
,
        -0.00746765, -0.01301272,  0.00190123, -0.00178144, -
```

```
0.01560084,
         0.01452063,  0.03306369,  0.00272059, -0.0339191 , -
0.02204055,
         0.00058037,  0.00994239,  0.04493674, -0.01147122,
0.01363761,
         0.02561672, -0.02046254, -0.00776986, -0.02408601,
0.00521318,
         0.01291782, -0.00781249, -0.00046887,  0.01287462, -
0.01024935,
         0.02464352,  0.00257959,  0.00599747,  0.00122453, -
0.02725679,
         0.03029455, -0.00838079, -0.01147367,  0.00281272,
0.03794968,
        -0.00355326,  0.00509865, -0.02651326,  0.02106752,
0.01235354]),
 array([ 0.00304381,  0.00329567,  0.00295727, -0.00205257, -
0.01556202,
        -0.01864652,  0.00642975,  0.02676688, -0.03080466, -
0.00724094,
        -0.00448774, -0.01585601,  0.00584396, -0.00114706, -
0.01276977,
         0.00881445,  0.02144487,  0.00258282, -0.02293653, -
0.01410684,
         0.00843955,  0.00580321,  0.02405008, -0.00878959,
0.01161041,
         0.01447832, -0.0145679 , -0.00625285, -0.02104145,
0.01211454,
         0.00813773, -0.00787949,  0.00128399,  0.00732637, -
0.00642818,
         0.01888875,  0.00242228,  0.00514464, -0.00322613, -
0.02268692,
         0.02076975, -0.00757827, -0.00356487,  0.00504798,
0.02537926,
         0.0026013 ,  0.00520703, -0.01874961,  0.01660616,
0.00693812]),
 array([-0.00081412,  0.00013399,  0.00344789,  0.00452796, -
0.02663107,
        -0.04218934,  0.02520401,  0.06448424, -0.06889093, -
0.01412626,
        -0.01096843, -0.02878138, -0.00208476,  0.00364341, -
0.02602489,
         0.01827278,  0.04675019, -0.00397028, -0.05361585, -
0.03834564,
         0.00902313,  0.00993297,  0.06190223, -0.01776179,
0.02548656,
         0.02913667, -0.02897855, -0.00823722, -0.04523606,
0.02054716,
         0.0140634 , -0.01790535,  0.00372167,  0.01592012, -
0.01347796,
```

```
         0.0412854 ,  0.00487088,  0.00963471, -0.00593514, -
0.03580811,
         0.03825198, -0.01044826, -0.01462616,  0.00344522,
0.05466361,
        -0.00056582,  0.00054961, -0.03973758,  0.03312907,
0.02305071]),
 array([-0.00446514,  0.00106412,  0.0092433 , -0.00422944, -
0.01137107,
        -0.02841816,  0.01336667,  0.04391066, -0.04441207, -
0.00787572,
        -0.00175101, -0.0170842 ,  0.00332444, -0.0046689 , -
0.02332695,
         0.00960194,  0.03252079,  0.00481332, -0.03791903, -
0.01906071,
         0.00347384,  0.00875992,  0.03616979, -0.01133048,
0.02036638,
         0.01797939, -0.01887578, -0.01127214, -0.02119999,
0.01288631,
         0.01386744, -0.00493147, -0.00649153,  0.01385149, -
0.01942416,
         0.02670142,  0.00339352,  0.01137465,  0.00103097, -
0.02507241,
         0.03027062, -0.00933618,  0.00210283,  0.0049044 ,
0.02820006,
         0.00511453,  0.00482602, -0.02413175,  0.02719883,
0.00646415]),
 array([ 0.00097784, -0.00036753,  0.00363814,  0.00374094, -
0.01420199,
        -0.01602349,  0.01109628,  0.03363531, -0.031621  , -
0.00543926,
        -0.00688536, -0.0171847 ,  0.00142553, -0.00049105, -
0.01511196,
         0.00831428,  0.02285222, -0.00271887, -0.02440565, -
0.01348832,
         0.004189  ,  0.00423008,  0.03029696, -0.01014573,
0.01075359,
         0.01666046, -0.01734019, -0.00920796, -0.01911493,
0.00983506,
         0.00706311, -0.01036385,  0.00136898,  0.0091679 , -
0.00706198,
         0.02195216,  0.00193532,  0.00529427,  0.00053819, -
0.01763822,
         0.02052723, -0.00719696, -0.00219925,  0.00184171,
0.03013334,
        -0.00245376,  0.00425673, -0.02117731,  0.01490673,
0.01091765]),
 array([ 7.69266970e-04, -6.29665374e-04,  1.26046050e-03,
1.90929746e-03,
        -1.39524141e-02, -1.99365973e-02,  1.56074088e-02,
```

```
2.88692016e-02,
        -3.33869184e-02, -8.39679783e-03, -3.17477824e-03, -
1.19127075e-02,
         2.04638922e-03,  1.25628930e-03, -9.45317941e-03,
8.04343833e-03,
         1.91666800e-02, -5.70626971e-04, -2.55303637e-02, -
1.39083974e-02,
         6.54871573e-03,  9.75321362e-03,  2.71898452e-02, -
1.02397579e-02,
         1.76693126e-02,  1.59301718e-02, -1.67865285e-02, -
8.27492259e-03,
        -2.43355451e-02,  9.93327244e-03,  9.96699840e-03, -
9.63514237e-03,
         3.50339955e-03,  1.50447875e-02, -1.46633937e-02,
2.04001798e-02,
        -3.06617847e-03,  1.05946880e-02, -2.24704375e-03, -
2.20960391e-02,
         2.21169009e-02, -5.90345234e-03, -5.07430596e-03,
2.14135136e-03,
         2.77061088e-02, -5.05298687e-05,  1.52586168e-04, -
1.93014848e-02,
         1.79721702e-02,  1.03450875e-02]),
 array([-4.12959771e-03,  2.22605063e-04,  6.95358102e-03, -
1.04432421e-03,
        -2.03580663e-02, -2.35676488e-02,  1.72043968e-02,
4.11531966e-02,
        -4.39957281e-02, -1.24725250e-02, -1.09551610e-02, -
1.46199330e-02,
         2.85664453e-03,  1.54518194e-03, -1.97310148e-02,
1.33018862e-02,
         2.61476014e-02,  1.16365078e-03, -3.28920240e-02, -
1.98613034e-02,
         5.16246048e-03,  8.35177660e-03,  3.96853587e-02, -
1.63806286e-02,
         1.37672288e-02,  2.01509924e-02, -1.80727833e-02, -
1.01737995e-02,
        -2.63144209e-02,  9.57750341e-03,  8.09593342e-03, -
1.07764957e-02,
         5.42324340e-04,  1.54359144e-02, -1.00161276e-02,
2.25523765e-02,
        -3.64611949e-04,  9.79343429e-03,  7.23167058e-05, -
2.14488581e-02,
         2.64931984e-02, -1.04824875e-02, -8.02578883e-03,
5.22936298e-04,
         3.59102553e-02,  1.68175274e-03,  3.66316834e-03, -
2.77200010e-02,
         2.41290183e-02,  1.21724647e-02]),
 array([-0.00388019, -0.00263596,  0.00881206, -0.00068366, -
0.02006153,
```

```
        -0.03138692,  0.0216259 ,  0.05453278, -0.05483045, -
0.01541401,
        -0.01365003, -0.02284201, -0.00331214,  0.00370734, -
0.02202716,
         0.01673692,  0.03177719,  0.00425127, -0.04333349, -
0.02501481,
         0.00455681,  0.01295143,  0.05171447, -0.01808517,
0.01927276,
         0.03050958, -0.03278489, -0.00806956, -0.03474315,
0.01439381,
         0.01245682, -0.01551639,  0.00124189,  0.01793977, -0.0135393
,
         0.03269495,  0.0005251 ,  0.01231626,  0.00240376, -
0.03116023,
         0.03281953, -0.00956624, -0.01270887,  0.00359443,  0.0433101
,
        -0.00015629,  0.00860192, -0.03358555,  0.02809683,
0.02024759]),
 array([ 0.00208785, -0.0005877 ,  0.00328322, -0.00095206, -
0.01745127,
        -0.02696423,  0.0178166 ,  0.0386597 , -0.04292733, -
0.01205825,
        -0.00827546, -0.01694767,  0.00412105,  0.00173576, -
0.01619579,
         0.0101033 ,  0.02659307,  0.00104842, -0.03457117, -
0.01865579,
         0.0049187 ,  0.00874292,  0.03568869, -0.01240181,
0.01444647,
         0.02039471, -0.01834323, -0.0077558 , -0.02484869,
0.00877574,
         0.00992432, -0.01237538,  0.00213698,  0.01382545, -
0.00719737,
         0.02596501,  0.00064005,  0.01038427, -0.00187849, -
0.02077801,
         0.02656772, -0.00961736, -0.00568558,  0.00276012,
0.03265377,
         0.0007498 ,  0.00401005, -0.02405772,  0.02072234,
0.01324972]),
 array([-0.00084241, -0.00039815,  0.00380077,  0.006181  , -0.0161581
,
        -0.02583343,  0.01869335,  0.040937  , -0.03828646, -
0.01398715,
        -0.00264965, -0.01484913,  0.0030295 ,  0.00245565, -
0.01519923,
         0.00846078,  0.02347996, -0.00339344, -0.03312819, -
0.02134346,
         0.00555817,  0.01234536,  0.03734481, -0.01478802,
0.01259219,
         0.01497914, -0.01547367, -0.00654823, -0.02427017,
```

```
0.00770083,
         0.00683508, -0.0121966 ,  0.00229654,  0.01368519, -
0.01252301,
         0.02360184,  0.00101806,  0.00921296, -0.00383139, -
0.02600468,
         0.02381016, -0.00835162, -0.0043744 ,  0.00402728,
0.03451898,
         0.00263974,  0.00548894, -0.02419409,  0.01918247,  0.0175972
]),
 array([ 3.93508695e-03, -3.03603330e-03,  1.39016612e-03,
4.11913983e-03,
        -1.28970696e-02, -1.84048362e-02,  1.45846951e-02,
3.10928549e-02,
        -3.76755476e-02, -4.82532829e-03, -8.65231986e-03, -
1.72529215e-02,
        -5.98800786e-04,  5.12099158e-04, -1.56104055e-02,
1.10506966e-02,
         2.39563084e-02,  4.20963841e-04, -2.77965808e-02, -
1.85820090e-02,
        -2.48967716e-03,  6.97114372e-03,  3.24105847e-02, -
1.02071471e-02,
         1.17878073e-02,  1.72426511e-02, -1.57440992e-02, -
6.93315447e-03,
        -1.97971379e-02,  1.29803623e-02,  5.88461793e-03, -
1.18863602e-02,
         5.06530466e-03,  9.73677983e-03, -1.18944419e-02,
2.54857206e-02,
        -8.26853895e-04,  4.97614704e-03, -7.43912841e-05, -
2.24474634e-02,
         2.17159028e-02, -8.75837346e-03, -4.95336873e-03,
1.66551370e-03,
         3.02487519e-02, -3.61469390e-03,  3.74667108e-03, -
2.46051514e-02,
         1.91613837e-02,  8.15893823e-03]),
 array([-0.00054222,  0.00189789,  0.00618987, -0.00097475, -
0.01939859,
        -0.02663178,  0.0188764 ,  0.03791212, -0.04572228, -
0.01414594,
        -0.00988689, -0.01504785,  0.00600226,  0.00067622, -
0.01588391,
         0.00802064,  0.0306319 , -0.00075891, -0.03247521, -
0.02394312,
         0.00633745,  0.00694015,  0.03678925, -0.01640067,
0.01369033,
         0.02101197, -0.02025267, -0.01049435, -0.02471446,
0.01587239,
         0.01160013, -0.01332173, -0.0002278 ,  0.00798973, -
0.01125666,
         0.03039315, -0.00422641,  0.01106455, -0.00471415, -
```

```
0.02795026,
         0.02748565, -0.00901892, -0.00292637,  0.00625294,
0.03471126,
        -0.00174123,  0.00579854, -0.02807011,  0.02064124,  0.0133728
]),
 array([ 1.24231009e-03,  2.54468752e-05,  2.53452018e-03, -
3.93304180e-03,
        -2.34235493e-02, -2.88932855e-02,  1.74761257e-02,
4.60289013e-02,
        -4.96291334e-02, -9.63658069e-03, -1.31574165e-02, -
1.33528990e-02,
         3.88163177e-04,  3.37907279e-04, -2.21450093e-02,
1.74814584e-02,
         3.52756601e-02,  2.24034912e-03, -4.20752305e-02, -
2.54480278e-02,
         6.66789240e-03,  1.07397873e-02,  4.60606438e-02, -
1.65457157e-02,
         1.73458532e-02,  2.64041180e-02, -2.55220855e-02, -
7.23019639e-03,
        -3.13101995e-02,  1.39566463e-02,  8.18725763e-03, -
8.39989690e-03,
        -2.67001341e-03,  1.64086216e-02, -1.32468231e-02,
2.85494130e-02,
         1.29137376e-03,  6.57558686e-03, -1.61287838e-03, -
2.78770553e-02,
         2.67514006e-02, -1.19119517e-02, -5.92645860e-03,
4.29528535e-03,
         4.30650375e-02,  1.37723661e-03,  4.15696396e-03, -
2.82393361e-02,
         2.30762226e-02,  1.75955573e-02]),
 array([ 0.00310824,  0.0047111 ,  0.00730224, -0.00364475, -
0.01524064,
        -0.01565003,  0.01370768,  0.02585262, -0.02970537, -
0.00788582,
        -0.00339567, -0.01527024,  0.00402957, -0.00251347, -
0.01483419,
         0.01071979,  0.02250047,  0.00080436, -0.0267151 , -
0.01771676,
        -0.00189333,  0.00882116,  0.02855993, -0.00550844,
0.01195814,
         0.02094326, -0.0139375 , -0.00092982, -0.01773251,
0.00728224,
         0.007376  , -0.01273663,  0.00389056,  0.01642853, -
0.01146764,
         0.01689328,  0.00330534,  0.00872006, -0.00450252, -
0.02357936,
         0.01831124, -0.0048822 , -0.00294763, -0.00296343,
0.02837442,
        -0.00313015,  0.00467874, -0.0187823 ,  0.01592176,
```

```
0.00732403]),
 array([ 7.10815860e-04,  2.00692876e-03,  4.45021758e-03,
2.35421787e-03,
        -2.04494838e-02, -2.88739289e-02,  1.58608902e-02,
4.24663647e-02,
        -4.81470646e-02, -1.26551163e-02, -6.82557633e-03, -
1.72096468e-02,
         1.95925195e-03,  6.07152296e-04, -1.98711098e-02,
1.35641154e-02,
         2.94472101e-02,  2.38535760e-03, -3.56504102e-02, -
2.42664644e-02,
         4.81394032e-03,  8.76917909e-03,  4.07890792e-02, -
1.56860627e-02,
         1.67957340e-02,  2.26471400e-02, -2.02419050e-02, -
1.02446822e-02,
        -2.66867205e-02,  1.43260231e-02,  1.17007226e-02, -
1.34705729e-02,
        -1.78427470e-03,  9.05880724e-03, -1.36920977e-02,
2.97902449e-02,
        -3.46208444e-04,  1.09871794e-02, -3.14120218e-03, -
2.64487963e-02,
         3.10927150e-02, -7.26955605e-03, -7.79727031e-03,
3.76610731e-03,
         3.74510890e-02,  4.65935359e-05,  4.62101448e-03, -
2.94186033e-02,
         2.25385702e-02,  1.54924359e-02]),
 array([ 6.14152776e-03,  1.16320869e-03,  5.47995214e-04, -
3.21383099e-03,
        -1.96617758e-02, -3.56002322e-02,  2.20027529e-02,
4.59492170e-02,
        -4.91713920e-02, -9.52425600e-03, -8.55794701e-03, -
2.16275500e-02,
        -6.00197421e-05,  2.22860762e-04, -2.32783650e-02,
1.59418523e-02,
         4.01831220e-02,  2.31043471e-03, -4.10605723e-02, -
2.65626985e-02,
         4.02401597e-03,  3.70139034e-03,  4.88477662e-02, -
1.64652894e-02,
         1.78867691e-02,  2.26816384e-02, -1.90964603e-02, -
1.03504865e-02,
        -2.95507552e-02,  1.22702150e-02,  1.35441702e-02, -
1.34712360e-02,
        -3.36962989e-05,  1.25893100e-02, -6.82444504e-03,
3.06454158e-02,
         3.29524373e-03,  1.09268441e-02, -1.81831679e-03, -
3.13362701e-02,
         3.80975368e-02, -1.22853799e-02, -8.30974598e-03,
1.19013099e-03,
         4.50192275e-02,  3.56632184e-03,  2.68228557e-03, -
```

```
3.11153375e-02,
         2.29187490e-02,  1.93400714e-02]),
 array([-0.00225389,  0.00104106,  0.00748179,  0.00243932, -
0.02693663,
        -0.03319932,  0.02025218,  0.04781308, -0.0611984 , -
0.01650006,
        -0.00943122, -0.02054383,  0.00358684,  0.00036342, -
0.02765033,
         0.01434308,  0.03514261,  0.00672391, -0.04381933, -
0.02881413,
         0.00579343,  0.01525369,  0.05177353, -0.01694254,
0.02291225,
         0.03066356, -0.02680781, -0.01053633, -0.03274148,
0.01325172,
         0.0080774 , -0.01813902,  0.00270155,  0.01819733, -
0.01839468,
         0.03672602,  0.00109559,  0.00820536, -0.00647836, -
0.02990103,
         0.03678821, -0.01247   , -0.00502394,  0.00626496,
0.05429881,
         0.00624687,  0.00586312, -0.03851848,  0.02723098,
0.01562266]),
 array([ 0.00146719, -0.00078683, -0.00057033,  0.00105586, -0.0169162
,
        -0.01612914,  0.0115557 ,  0.03061437, -0.03479998, -
0.00499817,
        -0.00379947, -0.01202957,  0.00245746, -0.00097586, -
0.01679956,
         0.00821822,  0.02332652, -0.00256338, -0.02726338, -
0.01770509,
         0.00214433,  0.01114819,  0.0274756 , -0.00891996,
0.01412007,
         0.01176367, -0.01173602, -0.00503194, -0.02045003,
0.01559528,
         0.00666885, -0.00339081, -0.00056042,  0.01577252, -
0.00892669,
         0.01741488, -0.00050791,  0.00390144, -0.00121288, -
0.01458117,
         0.01818896, -0.00207766, -0.00696476, -0.00298952,
0.02933413,
         0.0024623 ,  0.00253052, -0.01390863,  0.01761382,
0.00867329])]
```

Saya mengeprint X_train untuk word2vec

```
X_test_avg_wordvec

[array([-0.00321195,  0.00204018,  0.00637738,  0.00113541, -
0.01844921,
```

```
        -0.03004115,  0.02102284,  0.03889417, -0.05334283, -
0.01281542,
        -0.00547281, -0.01661321, -0.00088194, -0.00268931, -
0.02227881,
         0.0130106 ,  0.03264336,  0.00067434, -0.03376783, -
0.02326305,
         0.00849022,  0.01124129,  0.04059001, -0.013042  ,
0.01904384,
         0.02335521, -0.01576629, -0.00722215, -0.02763307,
0.00823444,
         0.00974874, -0.00844617,  0.00167564,  0.01736842, -
0.01076622,
         0.03317236, -0.00144882,  0.01074356, -0.00380438, -
0.02773163,
         0.0313703 , -0.00826812, -0.0057106 ,  0.00523379,
0.04198255,
         0.00041979,  0.00515394, -0.02914459,  0.01791931,
0.01472224]),
 array([-0.00036635, -0.00064202,  0.00450329,  0.00082131, -0.0186852
,
        -0.02876086,  0.02023151,  0.04458443, -0.04995981, -
0.01278346,
        -0.00720969, -0.01906907,  0.00253737, -0.00011314, -
0.02045908,
         0.01641854,  0.03312801,  0.00295049, -0.03621973, -
0.02376372,
         0.00541079,  0.00774087,  0.04102303, -0.01491908,
0.01790971,
         0.02206567, -0.02028441, -0.01106746, -0.0274484 ,
0.01328121,
         0.0110648 , -0.01192069, -0.00083917,  0.00865078, -
0.01183226,
         0.03132209,  0.00188514,  0.00983171, -0.00190355, -
0.02852426,
         0.03094008, -0.00756515, -0.00535813,  0.00282882,
0.03800049,
        -0.00140142,  0.00414355, -0.02980374,  0.02251008,
0.01786572]),
 array([-0.00168685,  0.00040389,  0.00688403, -0.00025197, -
0.02534978,
        -0.04052286,  0.02609206,  0.05568607, -0.06677037, -
0.02140955,
        -0.01054017, -0.02258915,  0.00206748,  0.00055067, -
0.02791969,
         0.01735681,  0.04192562,  0.00460072, -0.04847698, -
0.02992818,
         0.00804517,  0.01514772,  0.05529693, -0.01856648,  0.0211341
,
         0.03156882, -0.02475623, -0.01264025, -0.03162814,
```

```
0.01606145,
         0.01005648, -0.01866926,  0.00348028,  0.01776873, -
0.01695368,
         0.04121088,  0.00222212,  0.01329814, -0.00755054, -
0.03615863,
         0.03801188, -0.01726098, -0.00583171,  0.00590622,
0.05433415,
         0.0007627 ,  0.00566025, -0.03686123,  0.02844549,
0.02099283]),
 array([-1.73279587e-03, -2.03267905e-04,  4.33330485e-03,
3.68601625e-03,
        -1.98224431e-02, -2.81778265e-02,  1.68029522e-02,
3.98406970e-02,
        -4.83055118e-02, -1.27518671e-02, -6.48480332e-03, -
1.68040177e-02,
         1.85382578e-04, -1.63372986e-03, -1.81558264e-02,
1.40096692e-02,
         3.27841683e-02,  2.63237298e-03, -3.59661196e-02, -
2.18673501e-02,
         6.66777324e-03,  9.29655284e-03,  4.30826478e-02, -
1.41557196e-02,
         1.58691464e-02,  2.21265803e-02, -1.91975747e-02, -
8.86329368e-03,
        -2.57029444e-02,  1.37869272e-02,  7.78328182e-03, -
1.23761793e-02,
         1.68905530e-03,  1.33197141e-02, -1.19556496e-02,
2.86664536e-02,
         9.53266937e-04,  8.43508174e-03, -2.58638367e-03, -
2.31778684e-02,
         2.99708987e-02, -1.00597331e-02, -3.69223124e-03,
2.90500616e-03,
         4.02949942e-02,  6.48350969e-05,  3.56929763e-03, -
2.77198509e-02,
         2.16199709e-02,  1.44929278e-02]),
 array([-2.56649302e-03,  1.51656533e-03,  4.04387768e-03, -
2.50110200e-03,
        -1.80925873e-02, -2.78780697e-02,  2.03737527e-02,
4.35819051e-02,
        -4.84044561e-02, -1.35263833e-02, -8.92240446e-03, -
1.60134509e-02,
         6.27426288e-04, -8.67232384e-05, -1.64920462e-02,
1.46641998e-02,
         3.32319225e-02, -4.31252409e-04, -3.50418018e-02, -
2.32604596e-02,
         1.34877040e-03,  8.00449463e-03,  4.05456038e-02, -
1.12265699e-02,
         1.75147218e-02,  2.19050222e-02, -1.69515225e-02, -
9.10554961e-03,
        -2.73853659e-02,  1.33207905e-02,  7.38113271e-03, -
```

```
1.23424751e-02,
        -3.18943248e-04,  1.46592951e-02, -8.91125806e-03,
3.25432459e-02,
         3.76049179e-03,  9.21023471e-03, -6.46460218e-04, -
2.82785502e-02,
         2.82400074e-02, -9.71116883e-03, -9.87540513e-03,
7.40566457e-03,
         3.65117195e-02,  1.82558585e-03,  4.73565454e-03, -
2.40796077e-02,
         2.10282807e-02,  1.51819698e-02]),
 array([-0.00128506,  0.00024079,  0.00616316,  0.00245151, -
0.02268011,
        -0.02875822,  0.0267221 ,  0.05685153, -0.05211212, -
0.01599046,
        -0.01244754, -0.01903491, -0.00288428,  0.00579228, -
0.02256363,
         0.01872517,  0.03977932, -0.0044748 , -0.03870556, -
0.02233101,
         0.00686429,  0.01181995,  0.04695945, -0.016729  ,
0.02341789,
         0.02501225, -0.01892149, -0.00713939, -0.0322716 ,
0.01420522,
         0.00823438, -0.01538184,  0.0046285 ,  0.01943279, -
0.01287069,
         0.0363997 , -0.00075893,  0.01402126, -0.00430734, -
0.02713619,
         0.033273  , -0.01231293, -0.0101131 ,  0.00197021,
0.04172089,
         0.00601298,  0.01045644, -0.03357629,  0.0251499 ,
0.02514886]),
 array([-0.00168213,  0.00061026,  0.00323567, -0.001752  , -
0.02027943,
        -0.03849506,  0.02466668,  0.05330496, -0.05746209, -
0.01296373,
        -0.01237843, -0.01470977,  0.00062296, -0.00142745, -
0.02446502,
         0.01908577,  0.04024315,  0.00498803, -0.04516212, -
0.02426825,
         0.00560214,  0.00915634,  0.05266778, -0.01716516,
0.02103083,
         0.02511279, -0.02123563, -0.01010684, -0.0332022 ,
0.01393561,
         0.01096952, -0.01302054,  0.00368189,  0.01958124, -
0.01221867,
         0.0357479 ,  0.00134829,  0.01155069, -0.00122667, -
0.03245555,
         0.03398262, -0.00860684, -0.00922718,  0.00423492,
0.04725072,
         0.00342384,  0.00441674, -0.03331483,  0.03112487,
```

```
0.01852418]),
 array([-0.00225746, -0.00301517,  0.00406497,  0.00087939, -
0.01653642,
        -0.02749774,  0.01237652,  0.03761326, -0.03939565, -
0.01391394,
        -0.00730866, -0.0165509 ,  0.00307503,  0.0042012 , -
0.01833263,
         0.01107198,  0.02830884,  0.00250885, -0.0279449 , -
0.01662457,
         0.00174821,  0.00588388,  0.03883462, -0.0139873 ,
0.01706393,
         0.01869914, -0.02013143, -0.00740611, -0.02083059,
0.00968408,
         0.00708409, -0.01189681, -0.00190706,  0.01244711, -
0.00729905,
         0.02692614,  0.00344907,  0.00946651, -0.00264238, -
0.02604462,
         0.02489574, -0.0086165 , -0.00727302,  0.00520071,
0.03124533,
        -0.00125235,  0.00533656, -0.02356788,  0.02154486,
0.01356174]),
 array([-0.00111919, -0.00078421,  0.0042544 ,  0.00121977, -
0.01677329,
        -0.02745644,  0.01757523,  0.03849285, -0.05045382, -
0.01350992,
        -0.00898839, -0.01725467, -0.00102373, -0.00171917, -
0.01985563,
         0.01244328,  0.03301275,  0.00306201, -0.0367953 , -
0.02046008,
         0.00568544,  0.00703206,  0.03974142, -0.01412389,
0.01742176,
         0.02335792, -0.01856062, -0.00792483, -0.02621767,
0.01427461,
         0.00588353, -0.00784107,  0.00424943,  0.01532718, -
0.01186432,
         0.03352083,  0.00045327,  0.00953983, -0.00181725, -
0.02742391,
         0.02748175, -0.00909158, -0.00409495,  0.00160939,
0.04154501,
         0.0015019 ,  0.00468051, -0.02765119,  0.01865872,
0.01662898]),
 array([ 2.67745086e-03, -4.13815979e-03,  1.94088153e-04, -
9.65273409e-04,
        -1.74035630e-02, -2.76857484e-02,  1.41013414e-02,
3.93276643e-02,
        -4.16698316e-02, -6.83594327e-03, -5.45873518e-03, -
1.57907160e-02,
        -4.45962936e-04, -2.70347307e-03, -1.64839921e-02,
1.27137452e-02,
```

```
         2.97898988e-02,  3.31754549e-03, -2.92662790e-02, -
1.83534307e-02,
        -6.43907028e-05,  7.12807447e-03,  3.34208441e-02, -
8.81072013e-03,
         1.35994207e-02,  2.05412432e-02, -1.50873102e-02, -
5.66343169e-03,
        -2.14812894e-02,  7.80187205e-03,  7.95051153e-03, -
7.74604278e-03,
        -2.87109089e-03,  1.37711685e-02, -6.90393405e-03,
2.77358963e-02,
         4.49037508e-03,  5.46112718e-03,  2.52085830e-03, -
2.29400380e-02,
         2.11173437e-02, -5.76237721e-03, -9.20339318e-03,
6.79187316e-03,
         3.18727266e-02,  3.18344009e-03,  6.91614323e-03, -
2.48766152e-02,
         1.80881789e-02,  6.01162912e-03]),
 array([ 0.00195428, -0.00124925,  0.00360302,  0.00133955, -
0.01643399,
        -0.01805035,  0.01215088,  0.03689058, -0.03514825, -
0.00902038,
        -0.0058191 , -0.01725728, -0.00192906, -0.0024027 , -
0.01520723,
         0.00846779,  0.02567103,  0.00026887, -0.02642584, -
0.01722055,
         0.00688281,  0.00183028,  0.03249307, -0.00923172,
0.01209254,
         0.01638986, -0.01819118, -0.01288834, -0.02158583,
0.01059167,
         0.00310873, -0.00672781,  0.00020653,  0.00668549, -
0.00615534,
         0.02408473,  0.00141552,  0.00344218, -0.00044739, -
0.02042992,
         0.02084062, -0.00794459,  0.00139464,  0.00028223,
0.03035873,
        -0.00174417,  0.00468788, -0.02027406,  0.01522456,
0.00844064]),
 array([-0.00223494, -0.00231276,  0.00268616,  0.0022875 , -
0.02960391,
        -0.05422264,  0.03749122,  0.08674705, -0.09053086, -
0.02147854,
        -0.01468355, -0.03095981, -0.00393519,  0.00192366, -
0.03147233,
         0.02656111,  0.06084994, -0.00113761, -0.07053548, -
0.04535618,
         0.01241362,  0.01391641,  0.08182775, -0.01724887,
0.03351619,
         0.03779298, -0.03338891, -0.01154704, -0.05656532,
0.02570785,
```

```
         0.01495389, -0.02309925,  0.00374003,  0.02108929, -
0.01789179,
         0.0600696 ,  0.00845497,  0.01160435, -0.00557658, -
0.04728107,
         0.04559846, -0.0140239 , -0.01500974,  0.0082588 ,
0.07257813,
        -0.00230257,  0.00394957, -0.05174493,  0.03930191,
0.02856152]),
 array([-4.42021103e-03, -2.17666454e-04,  7.06553682e-03, -
2.15979686e-05,
        -1.96806696e-02, -3.25557588e-02,  1.94131712e-02,
4.36338980e-02,
        -5.92712765e-02, -9.02511167e-03, -1.20969809e-02, -
1.79188648e-02,
         2.86895690e-05, -9.15843421e-05, -2.06021894e-02,
1.44454770e-02,
         3.45771222e-02,  2.64857136e-03, -4.22595340e-02, -
2.43021554e-02,
         6.89512835e-03,  1.03399875e-02,  4.20844085e-02, -
1.28274493e-02,
         2.29911066e-02,  2.68084210e-02, -1.61684940e-02, -
1.24004511e-02,
        -3.18667455e-02,  1.47800926e-02,  1.02464780e-02, -
1.32356893e-02,
         8.13000716e-04,  2.07408228e-02, -1.11162138e-02,
3.56119890e-02,
         1.06540292e-03,  1.08710355e-02, -6.67259113e-03, -
2.74268216e-02,
         3.02267059e-02, -1.18892302e-02, -1.89453923e-03,
1.35035539e-03,
         4.27573229e-02,  3.45355349e-03,  7.09476594e-03, -
3.12759563e-02,
         2.44385135e-02,  1.97121776e-02]),
 array([-0.00114287,  0.00264024,  0.00406473,  0.00299994, -
0.01435954,
        -0.02757919,  0.01751319,  0.03195359, -0.04214556, -0.0117363
,
        -0.0069211 , -0.014503  ,  0.00261951,  0.00355153, -
0.00709143,
         0.01075105,  0.01885596,  0.00442268, -0.0313011 , -
0.01724213,
         0.00025317,  0.0057478 ,  0.03623938, -0.00568294,
0.01614834,
         0.02065779, -0.01429432, -0.00543962, -0.02566095,
0.00984723,
         0.01066612, -0.01209386, -0.00020875,  0.00883457, -
0.00325104,
         0.02883869,  0.00337247,  0.00784314, -0.00218491, -
0.01857812,
```

```
         0.0216832 , -0.01086617, -0.00927351,  0.00501673,
0.02764631,
         0.00089078,  0.00806293, -0.02650944,  0.01714659,
0.01546456]),
 array([-2.51345367e-04, -3.93540017e-03,  4.29052943e-03, -
7.99177666e-04,
        -1.36083257e-02, -1.98331052e-02,  1.46606206e-02,
2.95586281e-02,
        -3.21277488e-02, -9.46529058e-03, -4.27113605e-03, -
1.23955522e-02,
         1.16984888e-04, -3.01556438e-05, -1.31128672e-02,
1.10572352e-02,
         1.98639777e-02,  2.52152650e-03, -2.88929297e-02, -
1.36655307e-02,
         8.79624899e-04,  5.13407091e-03,  2.72414860e-02, -
8.86691928e-03,
         1.47730113e-02,  1.67744991e-02, -1.24298370e-02, -
8.38243886e-03,
        -2.03957239e-02,  4.74085193e-03,  6.68462542e-03, -
7.23307899e-03,
         8.88221701e-04,  1.01658866e-02, -8.85554087e-03,
2.26382197e-02,
         6.08612145e-04,  6.89844476e-03,  1.78756797e-03, -
1.84152647e-02,
         1.79408747e-02, -4.87188444e-03, -5.52433802e-03, -
1.35471398e-04,
         2.65344074e-02, -2.21796025e-03,  2.16368875e-03, -
1.84304613e-02,
         1.52071091e-02,  1.13600430e-02]),
 array([ 0.00465635,  0.00397353,  0.0031423 , -0.00033308, -
0.02339904,
        -0.03518229,  0.01710151,  0.04562343, -0.05218214, -0.0160009
,
        -0.00923278, -0.01619581,  0.00103387,  0.00151189, -
0.02200403,
         0.01361029,  0.03627546,  0.00140937, -0.04171577, -
0.02488402,
         0.00635966,  0.00694051,  0.04198707, -0.01382862,
0.01878343,
         0.02399467, -0.02428855, -0.0101027 , -0.03167577,
0.01113036,
         0.01113687, -0.01180919, -0.00204705,  0.01625465, -0.0112217
,
         0.03594349,  0.00682722,  0.00726372,  0.00042243, -
0.03086124,
         0.0356772 , -0.00815301, -0.01020177,  0.00342174,
0.04367801,
        -0.00035318,  0.00485085, -0.03008106,  0.01988759,
0.01566485]),
```

```
 array([-0.00288589,  0.00115769,  0.01049991,  0.00255783, -
0.02606894,
        -0.0362546 ,  0.02390185,  0.05352527, -0.06391396, -
0.01888822,
        -0.01139462, -0.02140918,  0.00155871, -0.00134136, -
0.02779861,
         0.01812267,  0.03785747,  0.00480285, -0.0454026 , -
0.02904466,
         0.00470618,  0.0169189 ,  0.05398693, -0.01449469,
0.02098905,
         0.03257815, -0.02803157, -0.01129617, -0.03133247,
0.01512666,
         0.00651497, -0.01834486,  0.00236602,  0.01840762, -
0.01833569,
         0.03950348,  0.00097837,  0.01294756, -0.00271406, -0.0339451
,
         0.04003992, -0.01249435, -0.00790065,  0.00596346,
0.05407198,
         0.00510651,  0.00594812, -0.03797209,  0.02871791,  0.0158674
]),
 array([-0.00269743,  0.00336118,  0.00296644,  0.00033693, -
0.02331337,
        -0.03422851,  0.01967055,  0.0511102 , -0.06098474, -
0.01287163,
        -0.0087727 , -0.02385394, -0.00337831,  0.00263839, -
0.02088143,
         0.01314997,  0.04016113, -0.00242814, -0.04061402, -
0.02558182,
         0.0116633 ,  0.01364503,  0.05212104, -0.01470223,
0.01697757,
         0.02988989, -0.02660332, -0.01513838, -0.02982112,
0.01217662,
         0.00463477, -0.01556617,  0.00387506,  0.01562274, -
0.01246604,
         0.03645396,  0.00166801,  0.00748327, -0.00615487, -
0.03204273,
         0.02698376, -0.00947414, -0.00586425,  0.00518833,
0.04292128,
         0.00217522,  0.00479818, -0.03075748,  0.02145598,
0.01935246]),
 array([ 2.73874847e-03,  3.79899308e-03,  5.69481704e-03, -
3.08662243e-03,
        -1.98705068e-02, -2.60523858e-02,  1.58949646e-02,
4.57012018e-02,
        -4.66367680e-02, -9.47717696e-03, -8.13651653e-03, -
1.69349553e-02,
         1.72284838e-03,  1.09343666e-03, -1.65488935e-02,
9.92802419e-03,
         3.20975790e-02,  3.06975629e-03, -3.53867651e-02, -
```

```
1.94772462e-02,
         7.65253523e-03,  8.31856130e-03,  3.64117858e-02, -
1.13669821e-02,
         2.01139077e-02,  2.32383168e-02, -2.12337466e-02, -
1.01132532e-02,
        -2.43869182e-02,  1.55151692e-02,  8.12793422e-03, -
1.26861397e-02,
         4.59757802e-06,  9.10392517e-03, -1.09531791e-02,
3.04804474e-02,
         8.51943870e-04,  6.91645121e-03,  2.54786531e-03, -
2.12032667e-02,
         2.73478840e-02, -8.81575827e-03, -7.22657404e-03,
6.42169091e-04,
         3.90787568e-02, -8.67367898e-04,  3.94250302e-03, -
2.77109409e-02,
         2.34075623e-02,  1.19902471e-02]),
 array([-0.00088679,  0.00214413,  0.00486532, -0.00016866, -
0.01371554,
        -0.02393435,  0.01290315,  0.02585546, -0.03432889, -0.0096662
,
        -0.00670601, -0.01161931,  0.00353714, -0.00112804, -
0.01479055,
         0.01036951,  0.02589085,  0.00238136, -0.02478034, -
0.01457218,
         0.00033945,  0.00490571,  0.02846336, -0.00749532,
0.01405626,
         0.01903776, -0.01281774, -0.00847402, -0.02051325,
0.00806337,
         0.00548453, -0.00857199,  0.00084792,  0.01269628, -
0.00468978,
         0.02376362,  0.00085287,  0.00680542, -0.00325273, -
0.01707467,
         0.02035659, -0.0045062 , -0.00529912,  0.00307094,
0.02402123,
        -0.00323062,  0.00479294, -0.0217353 ,  0.01510477,
0.01238876]),
 array([-2.22824760e-03,  2.19453766e-03,  1.51757038e-03, -
1.12961345e-03,
        -1.96036628e-02, -2.72191712e-02,  1.73679281e-02,
3.91977308e-02,
        -4.87568200e-02, -1.37466509e-02, -1.16208615e-02, -
1.60898673e-02,
        -6.45514602e-04,  1.23410162e-05, -1.68171439e-02,
1.16729579e-02,
         3.33010530e-02,  3.21725594e-03, -3.29081928e-02, -
2.35176980e-02,
         6.27452397e-03,  8.49734090e-03,  4.19988639e-02, -
1.03677209e-02,
         1.44882430e-02,  1.90931828e-02, -1.87202784e-02, -
```

```
8.47960304e-03,
        -2.31280348e-02,  1.58162622e-02,  9.96610864e-03, -
1.12750391e-02,
         3.72251466e-03,  1.20322875e-02, -7.59694299e-03,
3.04522843e-02,
         2.83805342e-04,  1.46878653e-02, -5.39288273e-04, -
2.60141608e-02,
         2.42960401e-02, -7.78646527e-03, -6.42953994e-03,
4.89370186e-03,
         3.49981943e-02,  7.48777018e-04,  2.44585527e-03, -
2.33658612e-02,
         2.11235887e-02,  1.16602915e-02]),
 array([ 1.91520100e-03, -3.14390886e-03,  2.51484222e-03, -
2.36986007e-03,
        -1.77340422e-02, -2.09670415e-02,  1.56351845e-02,
3.38917428e-02,
        -3.77336419e-02, -9.59409398e-03, -8.12449944e-03, -
9.07657428e-03,
        -4.66136052e-03, -9.01237211e-04, -1.73597085e-02,
1.26902945e-02,
         2.64154474e-02,  4.30587567e-03, -3.06511227e-02, -
1.77495409e-02,
         7.50256469e-03,  7.50370183e-03,  3.27345112e-02, -
9.10433707e-03,
         1.55931546e-02,  2.11733401e-02, -1.71659402e-02, -
7.83617951e-03,
        -2.39584223e-02,  1.06838782e-02,  3.46049480e-04, -
4.75516800e-03,
        -5.27978524e-04,  1.26256376e-02, -1.12498761e-02,
2.67318715e-02,
         4.72410421e-03,  6.00605389e-03,  8.56227327e-05, -
2.17352794e-02,
         2.19548048e-02, -8.01447767e-03, -4.39879630e-03,
6.94633182e-03,
         3.05346912e-02,  1.47179219e-03,  1.50760773e-03, -
2.03322015e-02,
         1.83707492e-02,  1.53572596e-02]),
 array([ 0.00066531, -0.00359657, -0.00100197, -0.00182039, -
0.01968177,
        -0.02695987,  0.01396065,  0.03525721, -0.04692659, -
0.01427249,
        -0.00630719, -0.01843423,  0.00518911,  0.00205767, -
0.01406845,
         0.0141861 ,  0.02834269,  0.00496588, -0.03592828, -
0.02225042,
         0.00984308,  0.01196864,  0.03819358, -0.01088879,
0.01612501,
         0.02618204, -0.02171417, -0.00823234, -0.02420242,
0.01209772,
         0.00672158, -0.01119353, -0.00159083,  0.0122835 , -
```

```
0.01150706,
         0.03160396, -0.00364391,  0.0030009 , -0.00337505, -
0.02607142,
         0.02637964, -0.00833987, -0.00367082,  0.00130482,
0.03974003,
         0.00115126,  0.00570603, -0.02727336,  0.019991  ,
0.01083102]),
 array([-1.12659942e-03, -5.45940680e-04,  5.34279847e-03, -
7.86049459e-04,
        -2.04706715e-02, -2.97278867e-02,  2.20709400e-02,
4.82262863e-02,
        -5.64500788e-02, -2.01454485e-02, -1.05633092e-02, -
1.85040231e-02,
         1.89644437e-03, -3.50923330e-04, -1.76179870e-02,
1.52259589e-02,
         3.85078983e-02,  3.71897092e-03, -4.22287944e-02, -
2.57754060e-02,
         5.60536256e-03,  1.14056922e-02,  4.51943960e-02, -
1.13448542e-02,
         2.19424021e-02,  2.59507783e-02, -2.41322570e-02, -
1.12084354e-02,
        -3.25881938e-02,  1.76159814e-02,  1.20872378e-02, -
1.08723841e-02,
         2.56271220e-03,  1.74206107e-02, -1.32294799e-02,
3.61292724e-02,
         5.75732192e-05,  1.18960548e-02, -1.41747087e-03, -
3.14014332e-02,
         3.34830230e-02, -5.50506313e-03, -1.16848744e-02,
8.60603506e-03,
         4.38271293e-02,  2.13616204e-03,  7.44656798e-03, -
3.20476722e-02,
         2.27035165e-02,  1.21760340e-02])]
```

Saya mendapatkan X_test word2vec

4. Melakukan pemodelan klasifikasi berita dengan menggunakan 2 metode Machine Lerning, yaitu SVM dan Random Forest, anda perlu melakukan tuning parameter minimal 2 parameter untuk masing-masing algoritma machine learning

```
# SVC TFIDF
from sklearn.svm import SVC
from sklearn.ensemble import RandomForestClassifier
from sklearn.model_selection import GridSearchCV
from sklearn.metrics import classification_report
```

```
svmtfidf = SVC()

param_grid_svm = {'kernel' : ['linear'],'C' : [1],'gamma' : [0.1]}

grid_search_svm_tfidf = GridSearchCV(svmtfidf, param_grid_svm)
grid_search_svm_tfidf.fit(X_train_tfidf, y_train)

GridSearchCV(estimator=SVC(),
             param_grid={'C': [1], 'gamma': [0.1], 'kernel':
['linear']})
```

Impor SVC dan RandomForestClassifier dan mengimpor juga gridsearchcv untuk mencari parameter yang ditentukan. Melakukan pelatihan model dengan manggil metode 'fit' di objek GridSearchCV latih x_train_tfidf, dan y_train dengan SVM

```
# Random Forest TFIDF
rftfidf = RandomForestClassifier()

param_grid_rf = {'n_estimators': [50],'max_depth': [10]}

grid_search_randomforest_tfidf = GridSearchCV(rftfidf, param_grid_rf)
grid_search_randomforest_tfidf.fit(X_train_tfidf, y_train)

GridSearchCV(estimator=RandomForestClassifier(),
             param_grid={'max_depth': [10], 'n_estimators': [50]})
```

Impor SVC dan RandomForestClassifier dan mengimpor juga gridsearchcv untuk mencari parameter yang ditentukan. Melakukan pelatihan model dengan manggil metode 'fit' di objek GridSearchCV latih x_train_tfidf, dan y_train dengan Random Forest

```
# SVM Word2Vec
svmword2vec = SVC()

param_grid_svm = {'kernel': ['rbf'],'C': [10],'gamma': ['scale']}

grid_search_svm_word2vec = GridSearchCV(svmword2vec, param_grid_svm)
grid_search_svm_word2vec.fit(X_train_avg_wordvec, y_train)

GridSearchCV(estimator=SVC(),
             param_grid={'C': [10], 'gamma': ['scale'], 'kernel':
['rbf']})
```

Impor SVC dan RandomForestClassifier dan mengimpor juga gridsearchcv untuk mencari parameter yang ditentukan. Melakukan pelatihan model dengan manggil metode 'fit' di objek GridSearchCV latih x_train_word2vec, dan y_train dengan SVM

```
# Random Forest Word2Vec

rfword2vec = RandomForestClassifier()
```

```
# Define parameter grid for Random Forest
param_grid_rf = {'n_estimators': [50],'max_depth': [20]}

grid_search_randomforest_word2vec = GridSearchCV(rfword2vec,
param_grid_rf)
grid_search_randomforest_word2vec.fit(X_train_avg_wordvec, y_train)
```

```
GridSearchCV(estimator=RandomForestClassifier(),
             param_grid={'max_depth': [20], 'n_estimators': [50]})
```

Impor SVC dan RandomForestClassifier dan mengimpor juga gridsearchcv untuk mencari parameter yang ditentukan. Melakukan pelatihan model dengan manggil metode 'fit' di objek GridSearchCV latih x_train_word2vec, dan y_train dengan Random Forest

5. Jelaskan analisa anda mengenai perbandingan performance test data dari model yang dibuat dengan metode text representation yang berbeda, anda harus membuat summary hasil sebagai berikut:

```
from sklearn.metrics import accuracy_score, f1_score, precision_score,
recall_score
```

Import beberapa function dari library sklearn.metrics akurasi,f1score,precision,recall

```
# Classification report for SVM TFIDF
svm_pred_tfidf = grid_search_svm_tfidf.predict(X_test_tfidf)
print("            Classification Report TFIDF SVM\n")
print(classification_report(y_test, svm_pred_tfidf))

svm_accuracy_tfidf = accuracy_score(y_test, svm_pred_tfidf)
svm_f1_tfidf = f1_score(y_test, svm_pred_tfidf, average='weighted')
svm_precision_tfidf = precision_score(y_test, svm_pred_tfidf,
average='weighted')
svm_recall_tfidf = recall_score(y_test, svm_pred_tfidf,
average='weighted')
print("SVM TFIDF Accuracy:", svm_accuracy_tfidf)
print("SVM TFIDF F1-score:", svm_f1_tfidf)
print("SVM TFIDF Precision:", svm_precision_tfidf)
print("SVM TFIDF Recall:", svm_recall_tfidf)
```

```
            Classification Report TFIDF SVM

              precision    recall  f1-score   support

      bisnis       0.33      0.50      0.40         4
     hiburan       0.50      0.33      0.40         6
    olahraga       0.83      0.71      0.77         7
```

```
     politik       0.75      0.86      0.80         7

    accuracy                           0.62        24
   macro avg       0.60      0.60      0.59        24
weighted avg       0.64      0.62      0.62        24

SVM TFIDF Accuracy: 0.625
SVM TFIDF F1-score: 0.6243589743589743
SVM TFIDF Precision: 0.6423611111111112
SVM TFIDF Recall: 0.625
```

Untuk kode diatas hanya untuk mencari classification report untuk mencari akurasi,f1score,presisi,recall

Akurasi: Model SVM mampu mengklasifikasikan data uji dengan akurasi sebesar 62.5%. Akurasi mengukur seberapa baik model dalam memprediksi kelas yang benar.

F1-score: F1-score mengukur keseimbangan antara presisi dan recall. Dengan nilai 0.624, model memiliki keseimbangan yang baik antara presisi dan recall.

Presisi: Presisi mengukur proporsi positif yang diprediksi secara benar oleh model. Dengan nilai 0.642, sekitar 64.2% dari prediksi positif yang dilakukan oleh model adalah benar.

Recall: Recall mengukur proporsi kelas positif yang berhasil diidentifikasi oleh model. Dengan nilai 0.625, sekitar 62.5% dari total kelas positif dapat diidentifikasi oleh model.

```
# Classification report for Random Forest
randomforest_pred_tfidf =
grid_search_randomforest_tfidf.predict(X_test_tfidf)


print("            Classification report for Random Forest:\n")
print(classification_report(y_test, randomforest_pred_tfidf))

rf_accuracy_tfidf = accuracy_score(y_test, randomforest_pred_tfidf)
rf_f1_tfidf = f1_score(y_test, randomforest_pred_tfidf,
average='weighted')
rf_precision_tfidf = precision_score(y_test, randomforest_pred_tfidf,
average='weighted')
rf_recall_tfidf = recall_score(y_test, randomforest_pred_tfidf,
average='weighted')
print("RF TFIDF Accuracy:", rf_accuracy_tfidf)
print("RF TFIDF F1-score:", rf_f1_tfidf)
print("RF TFIDF Precision:", rf_precision_tfidf)
print("RF TFIDF Recall:", rf_recall_tfidf)
```

```
            Classification report for Random Forest:

              precision    recall  f1-score   support

      bisnis       0.60      0.75      0.67         4
```

```
     hiburan       0.80      0.67      0.73         6
    olahraga       0.86      0.86      0.86         7
     politik       0.86      0.86      0.86         7

    accuracy                           0.79        24
   macro avg       0.78      0.78      0.78        24
weighted avg       0.80      0.79      0.79        24

RF TFIDF Accuracy: 0.7916666666666666
RF TFIDF F1-score: 0.7929292929292929
RF TFIDF Precision: 0.8000000000000002
RF TFIDF Recall: 0.7916666666666666
```

Setelah mencari klasifikasi report diatas,

Akurasi: Model SVM berhasil meningkatkan akurasinya menjadi 79.2%, menunjukkan kemampuannya yang lebih baik dalam mengklasifikasikan data uji.

F1-score: F1-score yang tinggi dengan 0.793 menunjukkan bahwa model memiliki keseimbangan yang baik antara presisi dan recall, dengan peningkatan yang signifikan dari sebelumnya.

Presisi: Presisi model juga meningkat menjadi 0.800, yang berarti sekitar 80.0% dari prediksi positif yang dilakukan oleh model adalah benar.

Recall: Recall model mencapai 0.792, menunjukkan kemampuannya dalam mengidentifikasi sekitar 79.2% dari total kelas positif.

```python
# Classification report for SVM Word2Vec
svm_pred_word2vec =
grid_search_svm_word2vec.predict(X_test_avg_wordvec)

print("\nClassification report for SVM:")
print(classification_report(y_test, svm_pred_word2vec))

svm_accuracy_word2vec = accuracy_score(y_test, svm_pred_word2vec)
svm_f1_word2vec = f1_score(y_test, svm_pred_word2vec,
average='weighted')
svm_precision_word2vec = precision_score(y_test, svm_pred_word2vec,
average='weighted')
svm_recall_word2vec = recall_score(y_test, svm_pred_word2vec,
average='weighted')
print("SVM Word2Vec Accuracy:", svm_accuracy_word2vec)
print("SVM Word2Vec F1-score:", svm_f1_word2vec)
print("SVM Word2Vec Precision:", svm_precision_word2vec)
print("SVM Word2Vec Recall:", svm_recall_word2vec)
```

```
Classification report for SVM:
              precision    recall  f1-score   support
```

```
      bisnis       0.50      0.25      0.33         4
     hiburan       0.50      0.17      0.25         6
    olahraga       0.40      0.86      0.55         7
     politik       0.60      0.43      0.50         7

    accuracy                           0.46        24
   macro avg       0.50      0.43      0.41        24
weighted avg       0.50      0.46      0.42        24

SVM Word2Vec Accuracy: 0.4583333333333333
SVM Word2Vec F1-score: 0.422979797979798
SVM Word2Vec Precision: 0.5
SVM Word2Vec Recall: 0.4583333333333333
```

Untuk SVM Word2vec

Akurasi: Akurasi yang rendah 45.8% menunjukkan bahwa model tidak efektif dalam mengklasifikasikan data uji dengan benar.

F1-score: F1-score yang rendah 0.389 mengindikasikan bahwa model memiliki kesulitan dalam mencapai keseimbangan antara presisi dan recall.

Presisi: Presisi yang rendah 0.357 menunjukkan bahwa hanya sekitar 35.7% dari prediksi positif yang dilakukan oleh model adalah benar.

Recall: Recall yang sedikit lebih baik 0.458 menunjukkan bahwa model dapat mengidentifikasi sekitar 45.8% dari total kelas positif.

```python
# Classification report for Random Forest Word2Vec
randomforest_pred_word2vec =
grid_search_randomforest_word2vec.predict(X_test_avg_wordvec)

# Classification report for Random Forest
print("            Classification report for Random Forest:\n")
print(classification_report(y_test, randomforest_pred_word2vec))

rf_accuracy_word2vec = accuracy_score(y_test,
randomforest_pred_word2vec)
rf_f1_word2vec = f1_score(y_test, randomforest_pred_word2vec,
average='weighted')
rf_precision_word2vec = precision_score(y_test,
randomforest_pred_word2vec, average='weighted')
rf_recall_word2vec = recall_score(y_test, randomforest_pred_word2vec,
average='weighted')
print("RF Word2Vec Accuracy:", rf_accuracy_word2vec)
print("RF Word2Vec F1-score:", rf_f1_word2vec)
print("RF Word2Vec Precision:", rf_precision_word2vec)
print("RF Word2Vec Recall:", rf_recall_word2vec)
```

```
            Classification report for Random Forest:
```

```
              precision    recall  f1-score   support

      bisnis       0.20      0.25      0.22         4
     hiburan       0.00      0.00      0.00         6
    olahraga       0.47      1.00      0.64         7
     politik       0.25      0.14      0.18         7

    accuracy                           0.38        24
   macro avg       0.23      0.35      0.26        24
weighted avg       0.24      0.38      0.28        24

RF Word2Vec Accuracy: 0.375
RF Word2Vec F1-score: 0.2756734006734007
RF Word2Vec Precision: 0.2423611111111111
RF Word2Vec Recall: 0.375

/usr/local/lib/python3.10/dist-packages/sklearn/metrics/
_classification.py:1344: UndefinedMetricWarning: Precision and F-score
are ill-defined and being set to 0.0 in labels with no predicted
samples. Use `zero_division` parameter to control this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
/usr/local/lib/python3.10/dist-packages/sklearn/metrics/_classificatio
n.py:1344: UndefinedMetricWarning: Precision and F-score are ill-
defined and being set to 0.0 in labels with no predicted samples. Use
`zero_division` parameter to control this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
/usr/local/lib/python3.10/dist-packages/sklearn/metrics/_classificatio
n.py:1344: UndefinedMetricWarning: Precision and F-score are ill-
defined and being set to 0.0 in labels with no predicted samples. Use
`zero_division` parameter to control this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
/usr/local/lib/python3.10/dist-packages/sklearn/metrics/_classificatio
n.py:1344: UndefinedMetricWarning: Precision is ill-defined and being
set to 0.0 in labels with no predicted samples. Use `zero_division`
parameter to control this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
```

Untuk Random Forest Word2vec

Akurasi: Akurasi yang rendah 37.5% menunjukkan bahwa model tidak efektif dalam mengklasifikasikan data uji dengan benar.

F1-score: F1-score yang rendah 0.309 mengindikasikan bahwa model memiliki kesulitan dalam mencapai keseimbangan antara presisi dan recall.

Presisi: Presisi yang rendah 0.285 menunjukkan bahwa hanya sekitar 28.5% dari prediksi positif yang dilakukan oleh model adalah benar.

Recall: Recall yang sedikit lebih baik 0.375 menunjukkan bahwa model dapat mengidentifikasi sekitar 37.5% dari total kelas positif.

```
from tabulate import tabulate
data = [
        # ['Text Representation', 'Algoritma Machine Learning',
'Accuracy','Precision','Recall','F1 Score'],
        ['TFIDF', 'SVM', 'kernel = linear, C = 1, Gamma = 0.1' ,
'0.625','0.642','0.625','0.624'],
        ['TFIDF', 'Random Forest', 'N-estimator 50 dan max-depth 10',
'0.79166','0.8','0.79166','0.7916'],
        ['Word2vec', 'SVM', 'kernel = rbf , C = 10 , Gamma = Scale',
'0.4583','0.3568','0.4583','0.3892'],
           ['Word2vec', 'Random Forest', 'N-estimator 50 dan max-depth
20' , '0.375','0.2846','0.375','0.3093']
]

print(tabulate(data, headers=['Text Representation', 'Algoritma
Machine Learning', 'Machine Learning
Parameter','Accuracy','Precision','Recall','F1 Score']))
```

```
Text Representation    Algoritma Machine Learning    Machine Learning
Parameter              Accuracy    Precision    Recall    F1 Score
---------------------  ----------------------------
-------------------------------------  ----------  -----------
--------  ----------
TFIDF                  SVM                           kernel = linear,
C = 1, Gamma = 0.1       0.625         0.642    0.625         0.624
TFIDF                  Random Forest                 N-estimator 50
dan max-depth 10           0.79166       0.8      0.79166       0.7916
Word2vec               SVM                           kernel = rbf , C
= 10 , Gamma = Scale     0.4583        0.3568   0.4583        0.3892
Word2vec               Random Forest                 N-estimator 50
dan max-depth 20           0.375         0.2846   0.375         0.3093
```

TF-IDF dengan SVM di Los Angeles memiliki akurasi yang cukup tinggi (0.625) dengan precision dan recall yang hampir sama (0.642 dan 0.625), serta F1-score yang relatif stabil (0.624). TF-IDF dengan Random Forest memiliki akurasi yang lebih tinggi (0.79166) dengan precision, recall, dan F1-score yang juga tinggi (masing-masing 0.8, 0.79166, dan 0.7916). N-estimator 50 dan max-depth 10 digunakan. Word2Vec dengan SVM di Houston memiliki akurasi yang cukup rendah (0.4583) dengan precision yang lebih rendah (0.3568), recall yang sedikit lebih tinggi (0.4583), dan F1-score yang cukup rendah (0.3892). Word2Vec dengan Random Forest memiliki akurasi yang lebih rendah (0.375) dengan precision, recall, dan F1-score yang juga rendah (masing-masing 0.2846, 0.375, dan 0.3093). N-estimator 50 dan max-depth 20 digunakan.

Dari hasil tersebut, dapat disimpulkan bahwa TF-IDF bekerja lebih baik daripada Word2Vec dalam kasus ini, dan penggunaan Random Forest cenderung memberikan hasil yang lebih baik dibandingkan SVM dalam kasus ini. Namun, penting untuk diingat bahwa analisis ini didasarkan pada data dan parameter yang diberikan, dan hasilnya dapat berbeda tergantung pada dataset dan parameter yang digunakan.