LAPORAN TUGAS KECIL 4

IF2211 Strategi Algoritma

Ekstraksi Informasi dari Artikel Berita dengan Algoritma Pencocokan String

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BAB I

DASAR TEORI

I. Algoritma Knuth-Morris-Pratt (KMP)

KMP adalah sebuah algoritma pencocokan string yang melakukan pencarian pola dari kiri ke kanan seperti algoritma brute force, tetapi dengan pergeseran yang dilakukan secara lebih ‘pintar’.

Pada algoritma bruteforce, pergeseran dilakukan satu per satu. Ini menyebabkan pencarian kurang efisien, karena algoritma mengecek lagi string yang sudah di pernah dicek sebelumnya. Algoritma KMP melakukan pergeseran ini dengan jauh lebih efisien.

Misalkan ada suatu teks T dan pola P. Jika ketidakcocokan terjadi pada T[i] dan P[j], maka pergeseran yang dilakukan adalah sebesar prefix terbesar P[0..j-1] yang juga merupakan suffix dari P[1..j-1].

Untuk dapat menjalankan algoritma KMP, diperlukan sebuah preprocessing untuk membentuk fungsi pinggiran KMP (border function / fail function). Misalkan j adalah posisi terjadinya ketidakcocokan dan k adalah satu posisi sebelum terjadinya ketidakcocokan (j-1), maka fungsi pinggiran KMP (fail[k]) didefinisikan sebagai panjang prefix terpanjang dari P[0..k] yang juga merupakan suffix dari P[1..k].

Contoh dari pembuatan border function:
P = “kukukakiku”

j	0	1	2	3	4	5	6	7	8	9
P[j]	k	u	k	u	k	a	k	i	k	u
k	-	0	1	2	3	4	5	6	7	8
fail[k]	-	0	1	2	3	0	1	0	1	2

Tabel 1.1 Pembuatan border function untuk P = “kukukakiku”

Saat j = 5, k bernilai 4. Dapat dilihat bahwa P[0..4] adalah “kukuk” dan P[1..4] adalah “ukuk”. Prefix terpanjang yang juga merupakan suffix adalah “kuk”, yang memiliki panjang 3. Maka, nilai dari fail[4] adalah 3.

Algoritma KMP lalu hanya perlu melihat tabel border function untuk mengetahui berapa banyak ia harus bergeser. Jika terjadi ketidakcocokan pada T[i] dan P[j], maka j diset dengan nilai fail[j-1].

II. Algoritma Boyer-Moore

BM adalah sebuah algoritma pencocokan string yang memanfaatkan dua buah teknik, yaitu teknik "looking-glass", yang mencari pola P pada suatu teks T dari bagian akhir string ke bagian awal string, dan teknik "character-jump", yang melakukan suatu lompatan ketika T[i] = x dan terjadi ketidakcocokan pada T[i] dan P[j] berdasarkan beberapa kasus yang mungkin terjadi.

Kasus pertama yaitu ketika P mengandung x. P akan digeser agar kemunculan terakhir x sejajar dengan T[i]. Kasus kedua yaitu ketika P mengandung x tetapi pergeseran tidak mungkin dilakukan. P akan digeser sejauh 1, P[j] menjadi sejajar dengan T[i+1]. Kasus ketiga, jika kasus pertama dan kedua tidak cocok (P tidak mengandung x), maka P digeser agar P[0] sejajar dengan T[i+1].

Preprocessing yang dilakukan oleh algoritma BM adalah preprocessing untuk membentuk fungsi kemunculan terakhir. Misalkan x adalah sebuah huruf yang sudah diubah menjadi angka (nilai asciinya). last[x] didefinisikan sebagai index terbesar i dimana P[i] = x, atau -1 bila tidak ada index yang memenuhi.

Contoh dari pembuatan last occurence function:
P = "aaabacada"

x	a	b	c	d	e
last[x]	8	3	5	7	-1

Tabel 1.2 Pembuatan last occurence function untuk P = "aaabacada"

III. Regex

Regular expression (regex) adalah notasi standar yang mendeskripsikan suatu pola (pattern) berupa urutan karakter atau string. Regex digunakan untuk pencocokan string (string matching) dengan efisien. Python sendiri memiliki library regex, yaitu re.

Beberapa fungsi yang ada di dalam library re Python antara lain:

- re.sub(pattern, replace, string): Mensubstitusikan pattern yang ada di dalam string dengan replace.
  Contoh: re.sub('config', '', 'coconfigfig') mengembalikan 'config'

- re.match(pattern, string): Mencocokkan bagian awal string (prefix) dengan pattern. Mengembalikan match object bila ada 0 atau lebih karakter pattern yang cocok pada bagian awal string.
  Contoh: re.match(‘pola’, ‘akupola’) mengembalikan object None karena pola bukan merupakan bagian awal string.

- re.search(pattern, string): Mencocokkan seluruh bagian string dengan pattern untuk mencari lokasi pertama dimana suatu kecocokan terjadi. Mengembalikan match object bila ada 0 atau lebih karakter pattern yang cocok pada suatu bagian string.
  Contoh: re.search(‘pola’, ‘akupola’) mengembalikan match object karena pola merupakan bagian dari ‘akupola’.

BAB II

KODE PROGRAM

Untuk backend, program memanfaatkan kakas flask. Sedangkan untuk frontend, program memanfaatkan CSS dan JS, dibantu dengan framework Bootstrap. Algoritma KMP, BM dan Regex diimplementasikan dalam bahasa Python.

1. algo.py (Algoritma KMP dan BM)

```
def computeFail(pattern):
     m = len(pattern)
     fail = [0 for x in range(m)]
     i, j = 1, 0
     while i < m:
     if pattern[j].lower() == pattern[i].lower():
          fail[i] = j + 1
          i += 1
          j += 1
     elif j > 0:
          j = fail[j-1]
     else:
          fail[i] = 0
          i += 1
     return fail

def KMP(text, pattern):
     n, m = len(text), len(pattern)
     fail = computeFail(pattern)
     i, j = 0, 0
     while i < n:
     if pattern[j].lower() == text[i].lower():
          if j == m - 1:
               return i - m + 1
          i += 1
          j += 1
     elif j > 0:
          j = fail[j-1]
     else:
          i += 1
     return -1

def buildLast(pattern):
     last = [-1 for x in range(128)]
```

```
     for i in range(len(pattern)):
     last[ord(pattern[i].lower())] = i
     return last

def BM(text, pattern):
     last = buildLast(pattern)
     n, m = len(text), len(pattern)
     i = m - 1
     if i > n - 1:
     return -1
     j = m - 1
     while True:
     if (pattern[j].lower() == text[i].lower()):
          if (j == 0):
               return i
          else:
               i -= 1
               j -= 1
     else:
          lo = last[ord(text[i].lower())]
          i += m - min(j, lo + 1)
          j = m - 1
     if (i > n - 1):
          break
     return -1
```

2. app.py (Backend)

```
import re, os, random, string, json, nltk
from nltk.tokenize import sent_tokenize
from algo import BM, KMP
from flask import Flask, render_template,
render_template_string, request, redirect

app = Flask(__name__)
app.config['SECRET_CODE'] = 'v3rys3cr3tstr1ng'

# Initialize results directory
results_dir = os.path.join(app.instance_path, 'results')
if not os.path.exists(os.path.dirname(results_dir)):
     os.makedirs(results_dir)

nltk.download('punkt')
```

```
keyword = ''
algorithm = ''
fileNames = []
foundSentences = []
foundCounts = []
foundDates = []
code = ''

@app.errorhandler(404)
def page_not_found(e):
     return render_template('404.html'), 404

# Home page
@app.route('/')
def home():
     return render_template('index.html')

# Displays result
@app.route('/result/<fileCode>')
def result(fileCode):
     global keyword, algorithm, code

     # For challenge purposes
     if fileCode == 'v3rys3cr3tstr1ng':
     return render_template('congrats.html')
     if not os.path.isfile(results_dir + '/' + fileCode):
     return render_template_string(fileCode)

     data = json.load(open(results_dir + '/' + fileCode))
     data = data[0]
     keyword = data['keyword']
     algorithm = data['algorithm']
     fileNames = data['fileNames']
     foundSentences = data['foundSentences']
     foundCounts = data['foundCounts']
     foundDates = data['foundDates']
     code = data['code']
     return render_template('result.html', keyword = keyword,
algorithm = algorithm, fileNames = fileNames, foundSentences =
foundSentences, foundCounts = foundCounts, foundDates =
foundDates, code = code)

# Text input
```

```
@app.route('/upload/text', methods=['POST'])
def uploadText():
     global keyword, algorithm, code
     clear()
     keyword = request.form['keywordText']
     algorithm = request.form['algorithmText']
     inputText = request.form['inputText']

     fileNames.append('Text')
     sentences = sent_tokenize(inputText)
     foundSentence, foundCount, foundDate =
findSentence(sentences, algorithm, keyword)
     foundSentences.append(foundSentence)
     foundCounts.append(foundCount)
     foundDates.append(foundDate)
     code = ''.join(random.choices(string.ascii_letters +
string.digits, k=16))
     data = [{'keyword': keyword, 'algorithm': algorithm,
'fileNames': fileNames, 'foundSentences': foundSentences,
'foundCounts': foundCounts, 'foundDates': foundDates, 'code':
code}]
     with open(results_dir + '/' + code, 'w') as file:
     json.dump(data, file)
     return redirect('/result/' + code)

# File input
@app.route('/upload/file', methods=['POST'])
def uploadFile():
     global keyword, algorithm, code
     clear()
     keyword = request.form['keywordFile']
     algorithm = request.form['algorithmFile']
     inputFiles = request.files.getlist('inputFiles')
     for file in inputFiles:
     fileNames.append(file.filename)
     text = file.read().decode('utf-8')
     sentences = sent_tokenize(text)
     foundSentence, foundCount, foundDate =
findSentence(sentences, algorithm, keyword)
     foundSentences.append(foundSentence)
     foundCounts.append(foundCount)
     foundDates.append(foundDate)
     code = ''.join(random.choices(string.ascii_letters +
string.digits, k=16))
```

```
     data = [{'keyword': keyword, 'algorithm': algorithm,
'fileNames': fileNames, 'foundSentences': foundSentences,
'foundCounts': foundCounts, 'foundDates': foundDates, 'code':
code}]
     with open(results_dir + '/' + code, 'w') as file:
     json.dump(data, file)
     return redirect('/result/' + code)

# See previous result by using given code
@app.route('/upload/code', methods=['POST'])
def uploadCode():
     return redirect('/result/' + request.form['code'])

# Clear variables
def clear():
     global keyword, algorithm, code
     keyword = ''
     algorithm = ''
     code = ''
     fileNames.clear()
     foundSentences.clear()
     foundCounts.clear()
     foundDates.clear()

# Find sentence(s) that contains keyword using chosen algorithm
def findSentence(sentences, algorithm, keyword):
     result = []
     count = []
     date = []
     newsDate = '-'
     # Find date from any sentence, starting from top (news
title)
     for sentence in sentences:
     newsDate = findDate(sentence, '')
     if newsDate != '-':
          break
     for sentence in sentences:
     if algorithm == 'KMP':
          index = KMP(sentence, keyword)
          if index != -1:
               result.append(highlight(sentence, keyword))
               count.append(findCount(sentence, keyword))
               date.append(findDate(sentence, keyword))
               if date[-1] == '-':
```

```
                    date[-1] = newsDate
     elif algorithm == 'BM':
          index = BM(sentence, keyword)
          if index != -1:
               result.append(highlight(sentence, keyword))
               count.append(findCount(sentence, keyword))
               date.append(findDate(sentence, keyword))
               if date[-1] == '-':
                    date[-1] = newsDate
     else:
          if re.search(keyword, sentence, flags=re.IGNORECASE):
               result.append(highlight(sentence, keyword))
               count.append(findCount(sentence, keyword))
               date.append(findDate(sentence, keyword))
               if date[-1] == '-':
                    date[-1] = newsDate
     return result, count, date

# Highlight keyword that is found in the sentence
def highlight(sentence, keyword):
     bold = "<b>" + keyword + "</b>"
     return re.sub(keyword, bold, sentence,
flags=re.IGNORECASE)

# Returns the closest number to the given keyword.
def findCount(sentence, keyword):
     regex =
re.search('(?:^|\s)((?:\d*\.*)*\d+)\s(?:[\(\-\s\w,:])*?' +
keyword + '|' + keyword +
'(?:[\)\-\s\w,:])*?\s((?:\d*\.*)*\d+)(?:$|\s|.|,)', sentence,
flags=re.IGNORECASE)
     if regex is not None:
     if regex.group(1) is not None:
          return regex.group(1)
     if regex.group(2) is not None:
          return regex.group(2)
     return '-'

# Returns the closest date to the given keyword.
# Example of supported date formats:
# 24 April
# 4 Mei
# 24/04/2020
# 17/04
```

```
# 2/12/19
def findDate(sentence, keyword):
     # DD Bulan
     regex =
re.search('(\d\d?\s(?:Januari|Februari|Maret|April|Mei|Juni|Jul
i|Agustus|September|November|Desember|Jan|Feb|Mar|Apr|Mei|Jun|J
ul|Aug|Sep|Okt|Nov|Des)).+(?:[\(\-\s\w,":])*?' + keyword + '|'
+ keyword +
'(?:[\(\-\s\w,":])*?(\d\d?\s(?:Januari|Februari|Maret|April|Mei
|Juni|Juli|Agustus|September|November|Desember|Jan|Feb|Mar|Apr|
Mei|Jun|Jul|Aug|Sep|Okt|Nov|Des)).+', sentence,
flags=re.IGNORECASE)
     if regex is not None:
     if regex.group(1) is not None:
          return regex.group(1)
     if regex.group(2) is not None:
          return regex.group(2)

     # DD/MM/YYYY
     regex =
re.search('\(?(\d\d?\/\d\d?\/?\d?\d?\d?\d?)\)?.+(?:[\(\-\s\w,":
])*?' + keyword + '|' + keyword +
'(?:[\(\-\s\w,":])*?\(?(\d\d?\/\d\d?\/?\d?\d?\d?\d?)\)?.+',
sentence, flags=re.IGNORECASE)
     if regex is not None:
     if regex.group(1) is not None:
          return regex.group(1)
     if regex.group(2) is not None:
          return regex.group(2)
     return '-'
```

3. index.html (Frontend - homepage)

```
<!DOCTYPE html>
<html lang="en">
<head>
     <meta charset="UTF-8">
     <meta name="viewport" content="width=device-width,
initial-scale=1.0">
     <meta http-equiv="X-UA-Compatible" content="ie=edge">

     <!-- Bootstrap css -->
     <link rel="stylesheet"
```

```
href="https://stackpath.bootstrapcdn.com/bootstrap/4.3.1/css/bo
otstrap.min.css"
integrity="sha384-ggOyR0iXCbMQv3Xipma34MD+dH/1fQ784/j6cY/iJTQUO
hcWr7x9JvoRxT2MZw1T" crossorigin="anonymous">

     <!-- Font Awesome -->
     <script
src="https://kit.fontawesome.com/be39655df2.js"></script>

     <!-- Own stylesheet -->
     <link rel="stylesheet" href="{{ url_for('static',
filename='styles.css') }}">

     <title>CoroFind</title>
</head>
<body class="background-grey">
     <nav class="navbar navbar-dark bg-primary">
     <a class="navbar-brand" href="/">CoroFind</a>
     </nav>
     <div class="jumbotron">
     <h1 class="display-4">Welcome</h1>
     <p class="lead">This is a website that helps you extract
information from news websites.</p>
     <hr class="my-4">
     <p>Start by clicking on one of these boxes below:</p>

     <div id="accordion">
          <div class="card">
               <div class="card-header" id="headingText">
                    <h5 class="mb-0">
                         <button class="btn btn-link"
data-toggle="collapse" data-target="#collapseText"
aria-expanded="true" aria-controls="collapseText">
                         Search by pasting text
                         </button>
                    </h5>
               </div>
               <div id="collapseText" class="collapse"
aria-labelledby="headingText" data-parent="#accordion">
                    <div class="card-body">
                         <form action="/upload/text"
method="post" enctype="multipart/form-data">
                         <div class="form-group">
                              <label for="inputText">Input your
```

```
text:</label>
                                   <textarea class="form-control"
rows="3" name="inputText" id="inputText" required></textarea>
                              </div>
                              <div class="form-group">
                                   <label for="keywordText">Keyword:
</label>
                                   <input class="form-control"
type="text" name="keywordText" id="keywordText"
placeholder="ODP" required>
                              </div>
                              <label for="algorithmText">Choose an
algorithm: </label>
                              <div class="form-check">
                                   <input class="form-check-input"
type="radio" name="algorithmText" id="KMP" value="KMP" checked>
                                   <label class="form-check-label"
for="KMP">KMP</label>
                              </div>
                              <div class="form-check">
                                   <input class="form-check-input"
type="radio" name="algorithmText" id="BM" value="BM">
                                   <label class="form-check-label"
for="BM">BM</label>
                              </div>
                              <div class="form-check">
                                   <input class="form-check-input"
type="radio" name="algorithmText" id="Regex" value="Regex">
                                   <label class="form-check-label"
for="Regex">Regex</label>
                              </div>
                              <button class="btn btn-primary mt-3"
type="submit">Submit</button>
                              </form>
                         </div>
                    </div>
               </div>

               <div class="card">
                    <div class="card-header" id="headingFile">
                         <h5 class="mb-0">
                              <button class="btn btn-link"
data-toggle="collapse" data-target="#collapseFile"
aria-expanded="false" aria-controls="collapseFile">
```

```
                         Search by uploading file(s)
                         </button>
                    </h5>
               </div>
               <div id="collapseFile" class="collapse show"
aria-labelledby="headingFile" data-parent="#accordion">
                    <div class="card-body">
                         <form action="/upload/file"
method="post" enctype="multipart/form-data">
                         <p>Upload your file(s):</p>
                         <div class="custom-file">
                              <label class="custom-file-label"
for="inputFiles"><span class="span-choose-file">Select
file(s)</span></label>
                              <input class="custom-file-input"
data-multiple-target="{count} files selected" type="file"
name="inputFiles" id="inputFiles" multiple>
                         </div>
                         <div class="form-group mt-2">
                              <label for="keywordFile">Keyword:
</label>
                              <input class="form-control"
type="text" name="keywordFile" id="keywordFile"
placeholder="positif" required>
                         </div>
                         <label for="algorithmFile">Choose an
algorithm: </label>
                         <div class="form-check">

                              <input class="form-check-input"
type="radio" name="algorithmFile" id="KMP" value="KMP" checked>
                              <label class="form-check-label"
for="KMP">KMP</label>
                         </div>
                         <div class="form-check">
                              <input class="form-check-input"
type="radio" name="algorithmFile" id="BM" value="BM">
                              <label class="form-check-label"
for="BM">BM</label>
                         </div>
                         <div class="form-check">
                              <input class="form-check-input"
type="radio" name="algorithmFile" id="Regex" value="Regex">
                              <label class="form-check-label"
```

```
for="Regex">Regex</label>
                              </div>
                              <button class="btn btn-primary mt-3"
type="submit">Submit</button>
                              </form>
                         </div>
                    </div>
               </div>

               <div class="card">
                    <div class="card-header" id="headingCode">
                         <h5 class="mb-0">
                              <button class="btn btn-link"
data-toggle="collapse" data-target="#collapseCode"
aria-expanded="false" aria-controls="collapseCode">
                              Open with code
                              </button>
                         </h5>
                    </div>
                    <div id="collapseCode" class="collapse"
aria-labelledby="headingCode" data-parent="#accordion">
                         <div class="card-body">
                              <form action="/upload/code"
method="post" enctype="multipart/form-data">
                              <div class="form-group">
                                   <label for="inputCode">Enter your
code: </label>
                                   <input class="form-control"
type="text" name="code" id="code" placeholder="Alphanumeric
characters">
                              </div>
                              <button class="btn btn-primary"
type="submit">Submit</button>
                              </form>
                         </div>
                    </div>
               </div>
          </div>
          </div>
          <footer class="navbar fixed-bottom navbar-dark
bg-primary">
          <span class="smaller-text white-text">Made by Morgen
Sudyanto (13518093) as a part of 'Algorithm Strategy' mini
project.</span>
```

```
     <ul class="navbar-nav navbar-expand-md">
          <li class="nav-item">
               <a href="https://twitter.com/moondemon68"><i
class="footer-icon fab fa-twitter"></i></a>
          </li>
          <li class="nav-item">
               <a href="https://github.com/moondemon68"><i
class="footer-icon fab fa-github"></i></a>
          </li>
          <li class="nav-item">
               <a
href="https://www.instagram.com/morgen_68/"><i
class="footer-icon fab fa-instagram"></i></a>
          </li>
          <li class="nav-item">
               <a href="mailto:moondemon68@gmail.com"><i
class="footer-icon fas fa-envelope"></i></a>
          </li>
     </ul>
     </footer>

     <!-- Bootstrap js -->
     <script
src="https://code.jquery.com/jquery-3.3.1.slim.min.js"
integrity="sha384-q8i/X+965DzO0rT7abK41JStQIAqVgRVzpbzo5smXKp4Y
fRvH+8abtTE1Pi6jizo" crossorigin="anonymous"></script>
     <script
src="https://cdnjs.cloudflare.com/ajax/libs/popper.js/1.14.7/um
d/popper.min.js"
integrity="sha384-UO2eT0CpHqdSJQ6hJty5KVphtPhzWj9WO1clHTMGa3JDZ
wrnQq4sF86dIHNDz0W1" crossorigin="anonymous"></script>
     <script
src="https://stackpath.bootstrapcdn.com/bootstrap/4.3.1/js/boot
strap.min.js"
integrity="sha384-JjSmVgyd0p3pXB1rRibZUAYoIIy6OrQ6VrjIEaFf/nJGz
IxFDsf4x0xIM+B07jRM" crossorigin="anonymous"></script>

     <!-- Custom js -->
     <script>
     $(document).on('change', '.custom-file-input', (e) => {

          const $this = $(e.target),
          $label = $this.prev('label'),
          $files = $this[0].files;
```

```
          let fileName = '';

          if ($files && $files.length > 1)
          fileName = ($this.attr('data-multiple-target') ||
'').replace('{count}', $files.length);
          else if (e.target.value)
          fileName = e.target.value.split('\\').pop();

          if (fileName) {
          $label.find('.span-choose-file').html(fileName);
          } else {
          $label.html($label.html());
          }

     });
     </script>
</body>
</html>
```

4. result.html (Frontend - search results)

```
<!DOCTYPE html>
<html lang="en">
<head>
     <meta charset="UTF-8">
     <meta name="viewport" content="width=device-width,
initial-scale=1.0">
     <meta http-equiv="X-UA-Compatible" content="ie=edge">

     <!-- Bootstrap css -->
     <link rel="stylesheet"
href="https://stackpath.bootstrapcdn.com/bootstrap/4.3.1/css/bo
otstrap.min.css"
integrity="sha384-ggOyR0iXCbMQv3Xipma34MD+dH/1fQ784/j6cY/iJTQUO
hcWr7x9JvoRxT2MZw1T" crossorigin="anonymous">

     <!-- Font Awesome -->
     <script src="https://kit.fontawesome.com/25734e3e8d.js"
crossorigin="anonymous"></script>

     <!-- Own stylesheet -->
     <link rel="stylesheet" href="{{ url_for('static',
filename='styles.css') }}">
```

```
     <title>Results - CoroFind</title>
</head>
<body class="background-grey">
     <nav class="navbar navbar-dark bg-primary">
     <a class="navbar-brand" href="/">CoroFind</a>
     </nav>
     <div class="container-fluid container-margin">
     {% if keyword | length %}
          <div class="row m-2">
               <div class="col">You searched for <b>{{ keyword
}}</b>.</div>
          </div>
     {% endif %}
     {% if algorithm | length %}
          <div class="row m-2">
               <div class="col">Algorithm used: {{ algorithm
}}</div>
          </div>
     {% endif %}
     {% for i in range(fileNames | length) %}
          <div class="card m-4">
               <div class="card-header">
                    <button class="btn btn-link btn-lg"
data-toggle="collapse" data-target="#collapse-{{ i }}"
aria-expanded="true" aria-controls="collapseOne">{{
fileNames[i] }}</button>
               </div>
               <ul class="list-group list-group-flush collapse
show" id="collapse-{{ i }}">
                    {% for j in range(foundSentences[i] |
length) %}
                         <li class="list-group-item">
                         <div class="row m-3">
                              <div class="col-md-6
col-sm-12">Jumlah: {{ foundCounts[i][j] }}</div>
                              <div class="col-md-6
col-sm-12">Tanggal: {{ foundDates[i][j] }}</div>
                         </div>
                         <div class="row m-3">
                              <div class="col">{{
foundSentences[i][j] | safe }}</div>
                         </div>
                         </li>
```

```
                    {% endfor%}
                </ul>
            </div>
        {% endfor %}
        <div class="row m-2">
            <div class="col">Use this code to view this page
again: {{ code }}</div>
        </div>
        <div class="row m-2">
            <div class="col"><a href="/" class="btn
btn-primary">Click here to go back</a></div>
        </div>
        </div>

        <footer class="navbar fixed-bottom navbar-dark
bg-primary">
        <span class="smaller-text white-text">Made by Morgen
Sudyanto (13518093) as a part of 'Algorithm Strategy' mini
project.</span>
        <ul class="navbar-nav navbar-expand-md">
            <li class="nav-item">
                <a href="https://twitter.com/moondemon68"><i
class="footer-icon fab fa-twitter"></i></a>
            </li>
            <li class="nav-item">
                <a href="https://github.com/moondemon68"><i
class="footer-icon fab fa-github"></i></a>
            </li>
            <li class="nav-item">
                <a
href="https://www.instagram.com/morgen_68/"><i
class="footer-icon fab fa-instagram"></i></a>
            </li>
            <li class="nav-item">
                <a href="mailto:moondemon68@gmail.com"><i
class="footer-icon fas fa-envelope"></i></a>
            </li>
        </ul>
        </footer>

        <!-- Bootstrap js -->
        <script
src="https://code.jquery.com/jquery-3.3.1.slim.min.js"
integrity="sha384-q8i/X+965DzO0rT7abK41JStQIAqVgRVzpbzo5smXKp4Y
```

```
fRvH+8abtTE1Pi6jizo" crossorigin="anonymous"></script>
     <script
src="https://cdnjs.cloudflare.com/ajax/libs/popper.js/1.14.7/um
d/popper.min.js"
integrity="sha384-UO2eT0CpHqdSJQ6hJty5KVphtPhzWj9WO1clHTMGa3JDZ
wrnQq4sF86dIHNDz0W1" crossorigin="anonymous"></script>
     <script
src="https://stackpath.bootstrapcdn.com/bootstrap/4.3.1/js/boot
strap.min.js"
integrity="sha384-JjSmVgyd0p3pXB1rRibZUAYoIIy6OrQ6VrjIEaFf/nJGz
IxFDsf4x0xIM+B07jRM" crossorigin="anonymous"></script>
</body>
</html>
```

5. styles.css (CSS)

```
/*Footer*/
footer {
     line-height: 3rem;
}

.container-margin {
     margin-top: 2%;
     margin-bottom: 5%;
}

.footer-icon {
     padding: 10px;
     color: #FFFFFF;
}

.fa-twitter:hover {
     color: #007BFF;
}

.fa-github:hover {
     color: #000000;
}

.fa-instagram:hover {
     color: #CD4BA1;
}
```

```
.fa-envelope:hover {
     color: #D93025;
}

.background-grey {
     background-color: #E9ECEF;
}

.smaller-text {
     font-size: 1rem;
}

.white-text {
     color: #FFFFFF;
}

@media only screen and (max-width: 767px) {
     .navbar {
     position:relative;
     }
}
```

6. 404.html (error handler)

```
<!DOCTYPE html>
<html lang="en">
<head>
     <meta charset="UTF-8">
     <meta name="viewport" content="width=device-width,
initial-scale=1.0">
     <meta http-equiv="X-UA-Compatible" content="ie=edge">

     <!-- Bootstrap css -->
     <link rel="stylesheet"
href="https://stackpath.bootstrapcdn.com/bootstrap/4.3.1/css/bo
otstrap.min.css"
integrity="sha384-ggOyR0iXCbMQv3Xipma34MD+dH/1fQ784/j6cY/iJTQUO
hcWr7x9JvoRxT2MZw1T" crossorigin="anonymous">

     <!-- Font Awesome -->
     <script
src="https://kit.fontawesome.com/be39655df2.js"></script>
```

```
     <!-- Own stylesheet -->
     <link rel="stylesheet" href="{{ url_for('static',
filename='styles.css') }}">

     <title>CoroFind</title>
</head>
<body class="background-grey">
     <nav class="navbar navbar-dark bg-primary">
     <a class="navbar-brand" href="/">CoroFind</a>
     </nav>
     <p style="text-align:center;"><img src="{{
url_for('static', filename='404.png') }}" alt="404"></p>
     <h1 style="text-align:center;">Page not found lmao</h1>
     <p style="text-align:center; font-size:0.5rem">Imagine
getting rickrolled in 2020</p>
     <p style="text-align:center;"><iframe
src="https://giphy.com/embed/lgcUUCXgC8mEo" width="480"
height="360" frameBorder="0" class="giphy-embed"
allowFullScreen></iframe><p><a
href="https://giphy.com/gifs/rick-roll-lgcUUCXgC8mEo"></a></p><
/p>
     <p style="text-align:center;"><a href="/" class="btn
btn-primary">Click here to go back</a></p>
     <footer class="navbar fixed-bottom navbar-dark
bg-primary">
     <span class="smaller-text white-text">Made by Morgen
Sudyanto (13518093) as a part of 'Algorithm Strategy' mini
project.</span>
     <ul class="navbar-nav navbar-expand-md">
          <li class="nav-item">
               <a href="https://twitter.com/moondemon68"><i
class="footer-icon fab fa-twitter"></i></a>
          </li>
          <li class="nav-item">
               <a href="https://github.com/moondemon68"><i
class="footer-icon fab fa-github"></i></a>
          </li>
          <li class="nav-item">
               <a
href="https://www.instagram.com/morgen_68/"><i
class="footer-icon fab fa-instagram"></i></a>
          </li>
          <li class="nav-item">
               <a href="mailto:moondemon68@gmail.com"><i
```

```
class="footer-icon fas fa-envelope"></i></a>
          </li>
     </ul>
     </footer>

     <!-- Bootstrap js -->
     <script
src="https://code.jquery.com/jquery-3.3.1.slim.min.js"
integrity="sha384-q8i/X+965DzO0rT7abK41JStQIAqVgRVzpbzo5smXKp4Y
fRvH+8abtTE1Pi6jizo" crossorigin="anonymous"></script>
     <script
src="https://cdnjs.cloudflare.com/ajax/libs/popper.js/1.14.7/um
d/popper.min.js"
integrity="sha384-UO2eT0CpHqdSJQ6hJty5KVphtPhzWj9WO1clHTMGa3JDZ
wrnQq4sF86dIHNDz0W1" crossorigin="anonymous"></script>
     <script
src="https://stackpath.bootstrapcdn.com/bootstrap/4.3.1/js/boot
strap.min.js"
integrity="sha384-JjSmVgyd0p3pXB1rRibZUAYoIIy6OrQ6VrjIEaFf/nJGz
IxFDsf4x0xIM+B07jRM" crossorigin="anonymous"></script>

     <!-- Custom js -->
     <script>
     $(document).on('change', '.custom-file-input', (e) => {

          const $this = $(e.target),
          $label = $this.prev('label'),
          $files = $this[0].files;
          let fileName = '';

          if ($files && $files.length > 1)
          fileName = ($this.attr('data-multiple-target') ||
'').replace('{count}', $files.length);
          else if (e.target.value)
          fileName = e.target.value.split('\\').pop();

          if (fileName) {
          $label.find('.span-choose-file').html(fileName);
          } else {
          $label.html($label.html());
          }

     });
     </script>
```

```
</body>
</html>
```

7. congrats.html (Page tambahan sebagai challenge)

```
<!DOCTYPE html>
<html lang="en">
<head>
     <meta charset="UTF-8">
     <meta name="viewport" content="width=device-width,
initial-scale=1.0">
     <meta http-equiv="X-UA-Compatible" content="ie=edge">

     <!-- Bootstrap css -->
     <link rel="stylesheet"
href="https://stackpath.bootstrapcdn.com/bootstrap/4.3.1/css/bo
otstrap.min.css"
integrity="sha384-ggOyR0iXCbMQv3Xipma34MD+dH/1fQ784/j6cY/iJTQUO
hcWr7x9JvoRxT2MZw1T" crossorigin="anonymous">

     <!-- Font Awesome -->
     <script
src="https://kit.fontawesome.com/be39655df2.js"></script>

     <!-- Own stylesheet -->
     <link rel="stylesheet" href="{{ url_for('static',
filename='styles.css') }}">

     <title>CoroFind</title>
</head>
<body class="background-grey">
     <nav class="navbar navbar-dark bg-primary">
     <a class="navbar-brand" href="/">CoroFind</a>
     </nav>
     <h1 style="text-align:center;">Congratulations!</h1>
     <p style="text-align:center;"><img src="{{
url_for('static', filename='not-important-image.png') }}"
alt="404"></p>
     <footer class="navbar fixed-bottom navbar-dark
bg-primary">
     <span class="smaller-text white-text">Made by Morgen
Sudyanto (13518093) as a part of 'Algorithm Strategy' mini
project.</span>
```

```
     <ul class="navbar-nav navbar-expand-md">
          <li class="nav-item">
               <a href="https://twitter.com/moondemon68"><i
class="footer-icon fab fa-twitter"></i></a>
          </li>
          <li class="nav-item">
               <a href="https://github.com/moondemon68"><i
class="footer-icon fab fa-github"></i></a>
          </li>
          <li class="nav-item">
               <a
href="https://www.instagram.com/morgen_68/"><i
class="footer-icon fab fa-instagram"></i></a>
          </li>
          <li class="nav-item">
               <a href="mailto:moondemon68@gmail.com"><i
class="footer-icon fas fa-envelope"></i></a>
          </li>
     </ul>
     </footer>

     <!-- Bootstrap js -->
     <script
src="https://code.jquery.com/jquery-3.3.1.slim.min.js"
integrity="sha384-q8i/X+965DzO0rT7abK41JStQIAqVgRVzpbzo5smXKp4Y
fRvH+8abtTE1Pi6jizo" crossorigin="anonymous"></script>
     <script
src="https://cdnjs.cloudflare.com/ajax/libs/popper.js/1.14.7/um
d/popper.min.js"
integrity="sha384-UO2eT0CpHqdSJQ6hJty5KVphtPhzWj9WO1clHTMGa3JDZ
wrnQq4sF86dIHNDz0W1" crossorigin="anonymous"></script>
     <script
src="https://stackpath.bootstrapcdn.com/bootstrap/4.3.1/js/boot
strap.min.js"
integrity="sha384-JjSmVgyd0p3pXB1rRibZUAYoIIy6OrQ6VrjIEaFf/nJGz
IxFDsf4x0xIM+B07jRM" crossorigin="anonymous"></script>

     <!-- Custom js -->
     <script>
     $(document).on('change', '.custom-file-input', (e) => {

          const $this = $(e.target),
          $label = $this.prev('label'),
          $files = $this[0].files;
```

```
          let fileName = '';

          if ($files && $files.length > 1)
          fileName = ($this.attr('data-multiple-target') ||
'').replace('{count}', $files.length);
          else if (e.target.value)
          fileName = e.target.value.split('\\').pop();

          if (fileName) {
          $label.find('.span-choose-file').html(fileName);
          } else {
          $label.html($label.html());
          }

     });
     </script>
</body>
</html>
```

BAB III

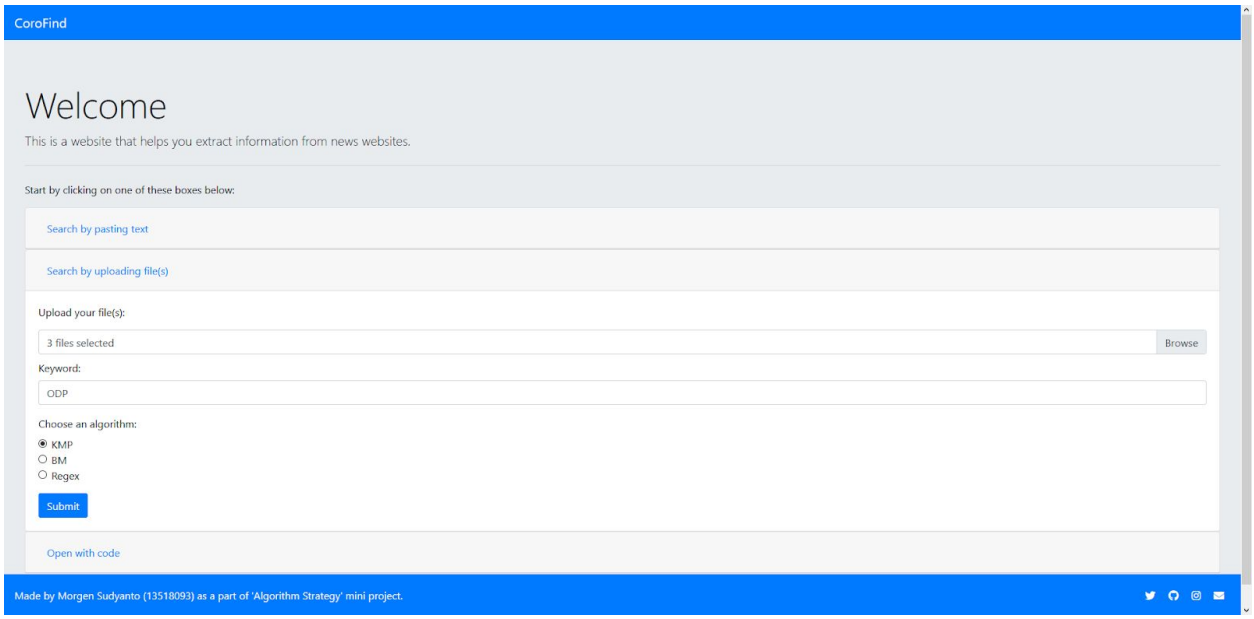
SCREENSHOT INPUT-OUTPUT PROGRAM

I. Input dengan file

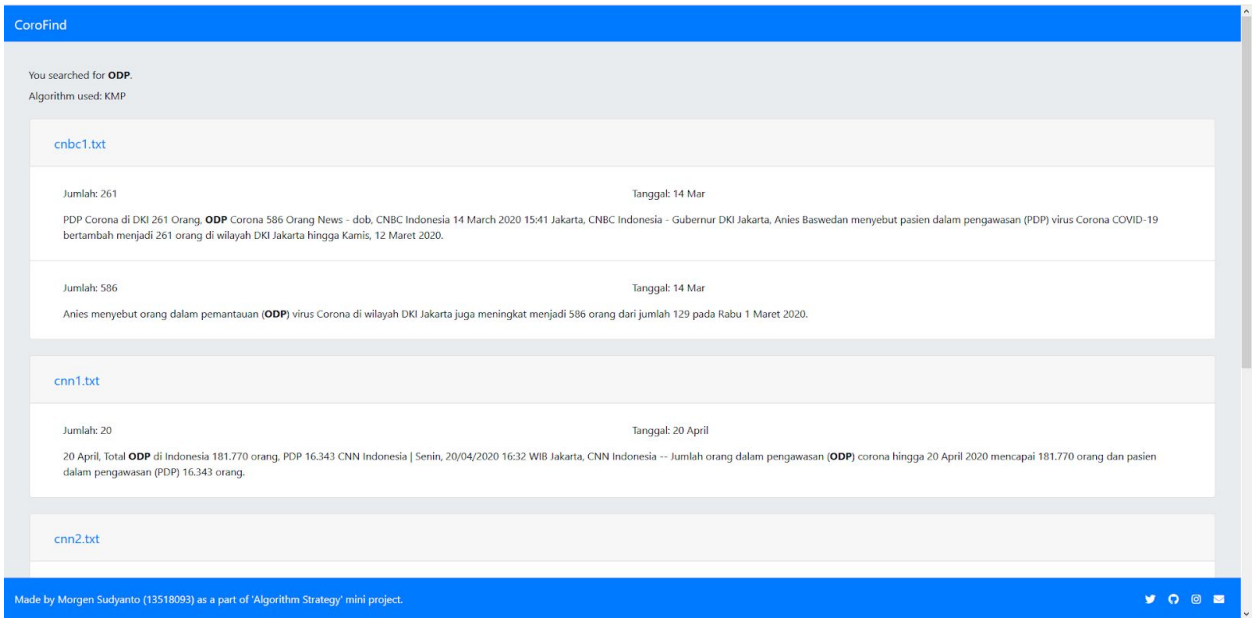
A. file: "cnn2.txt", "cnbc1.txt", "cnn1.txt"

B. keyword: ODP

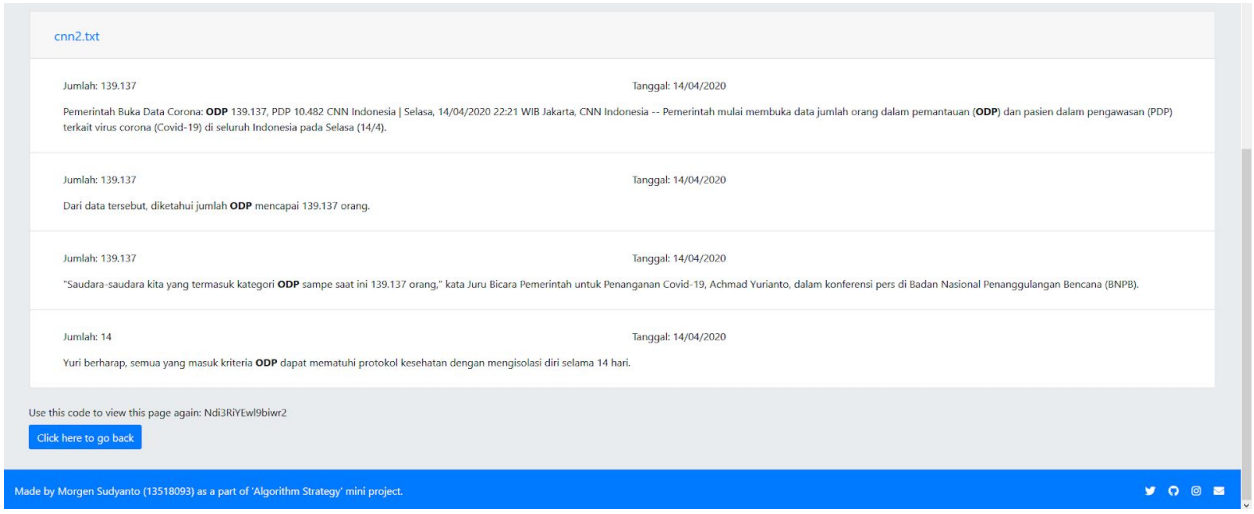
C. algoritma: KMP



Gambar 3.1 Tampilan input dengan file



Gambar 3.2 Tampilan output 1



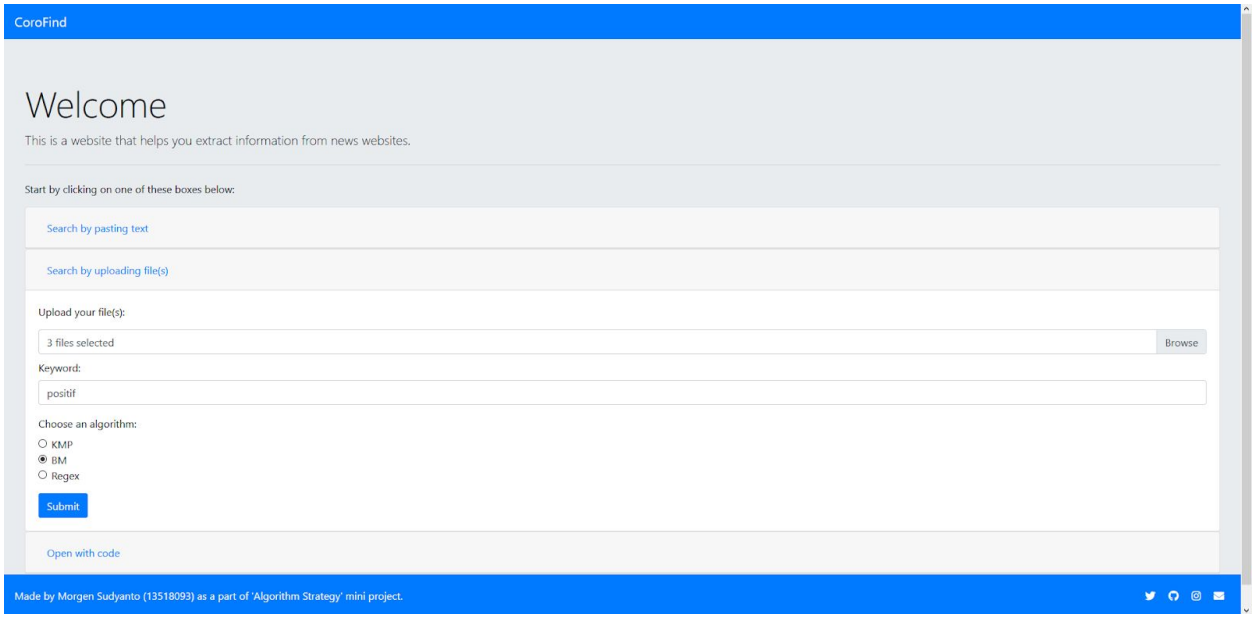
Gambar 3.3 Tampilan output 2

II. Input dengan file

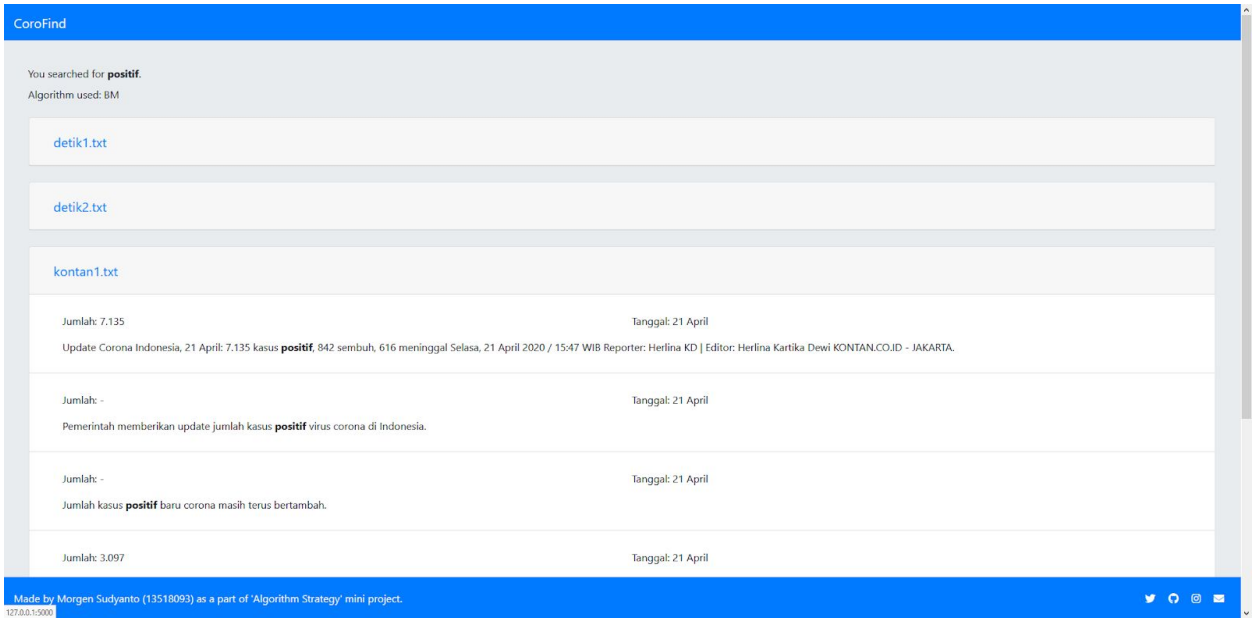
A. file: "kontan1.txt" "detik1.txt" "detik2.txt"

B. keyword: positif

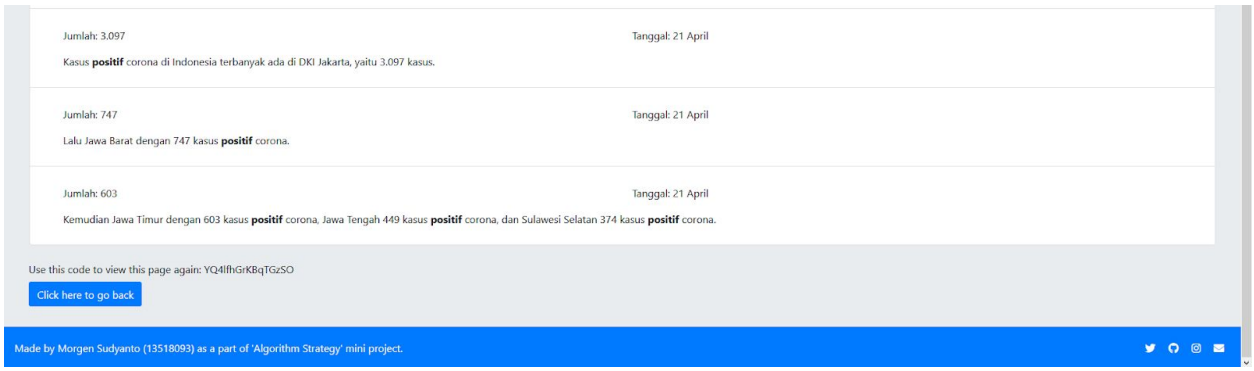
C. algoritma: BM



Gambar 3.4 Tampilan input dengan file



Gambar 3.5 Tampilan output 1



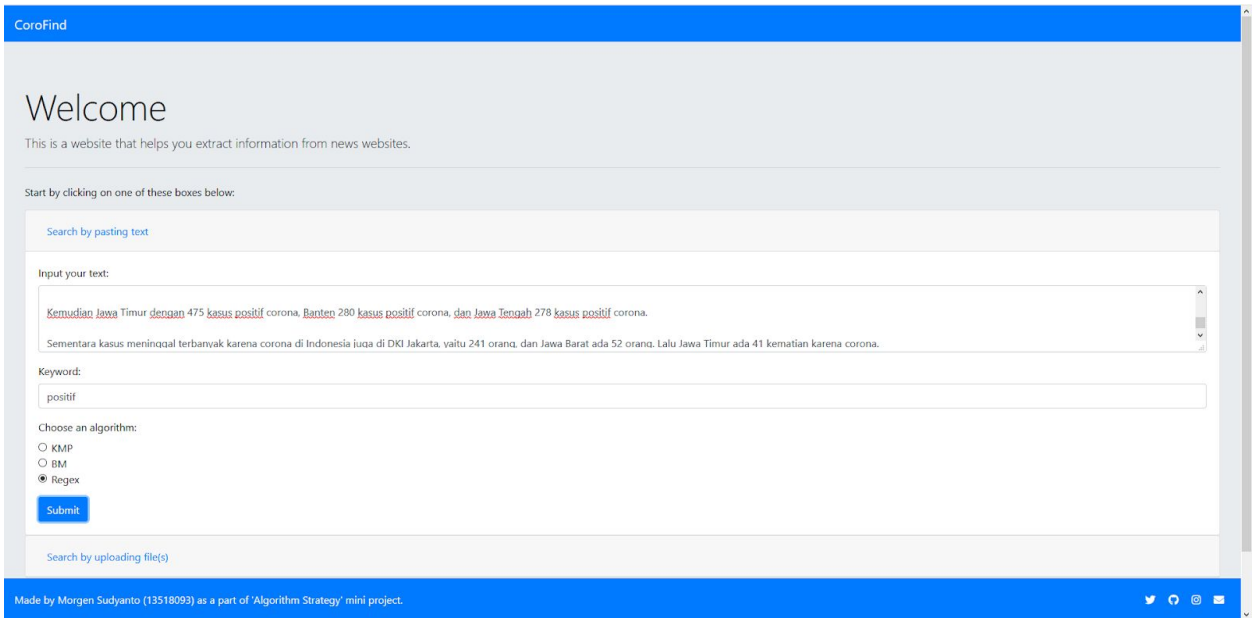
Gambar 3.6 Tampilan output 2

III. Input dengan text

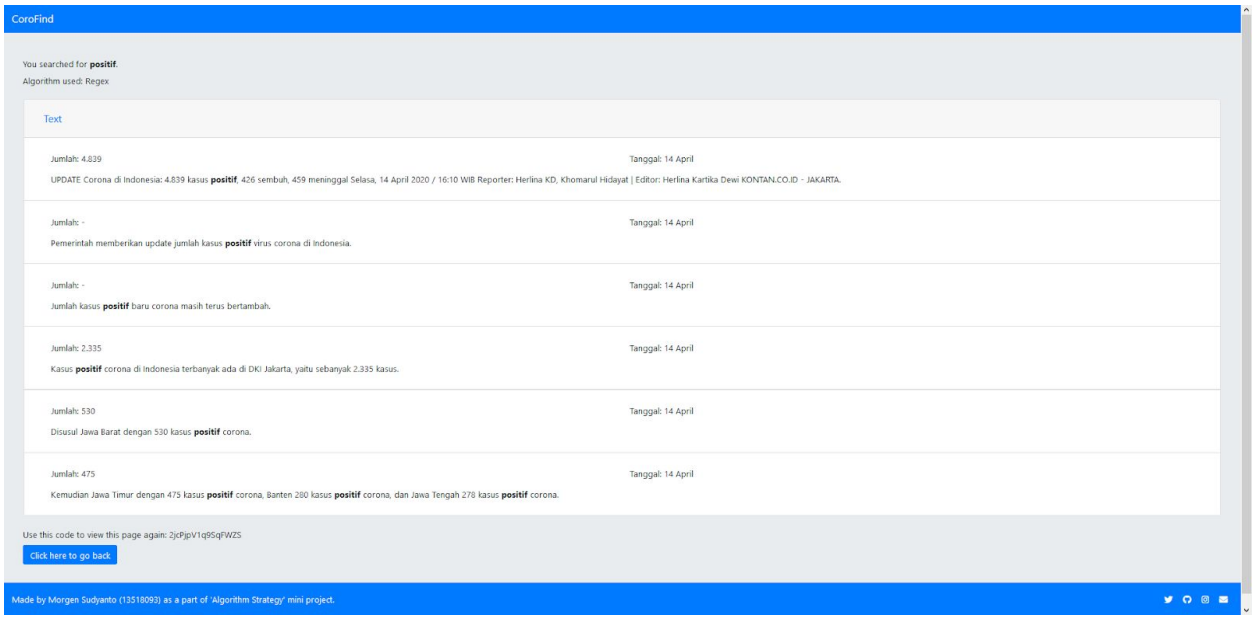
A. file: "kontan2.txt" (di copy-paste)

B. keyword: positif

C. algoritma: Regex



Gambar 3.7 Tampilan input dengan text



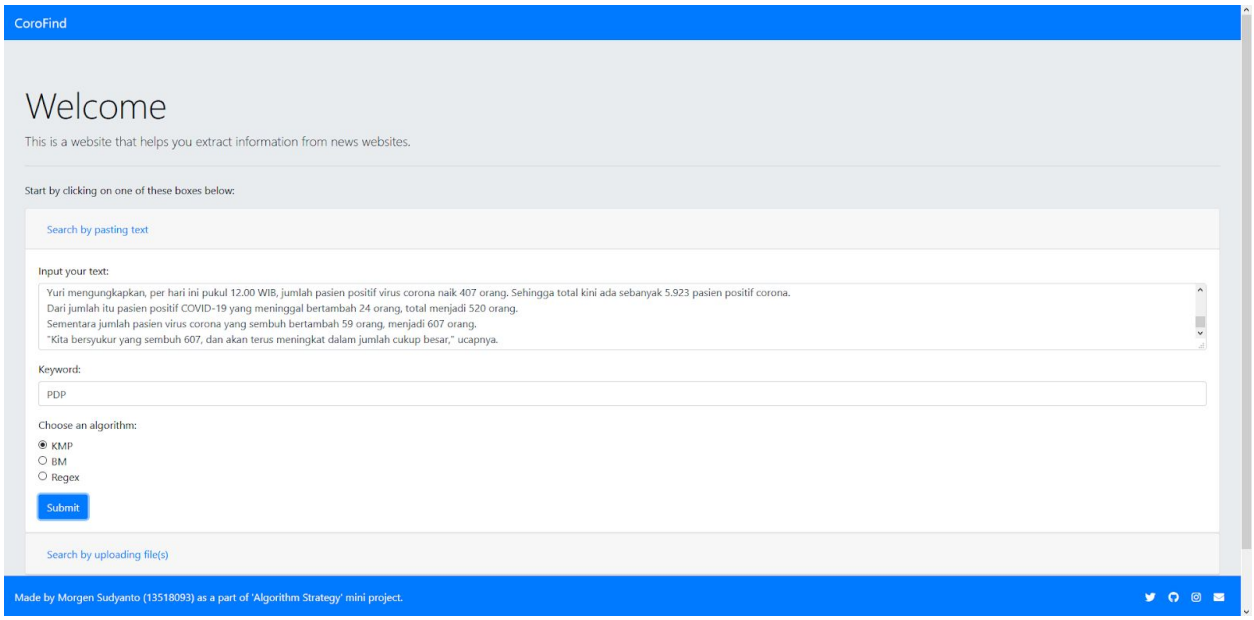
Gambar 3.8 Tampilan output

IV. Input dengan text

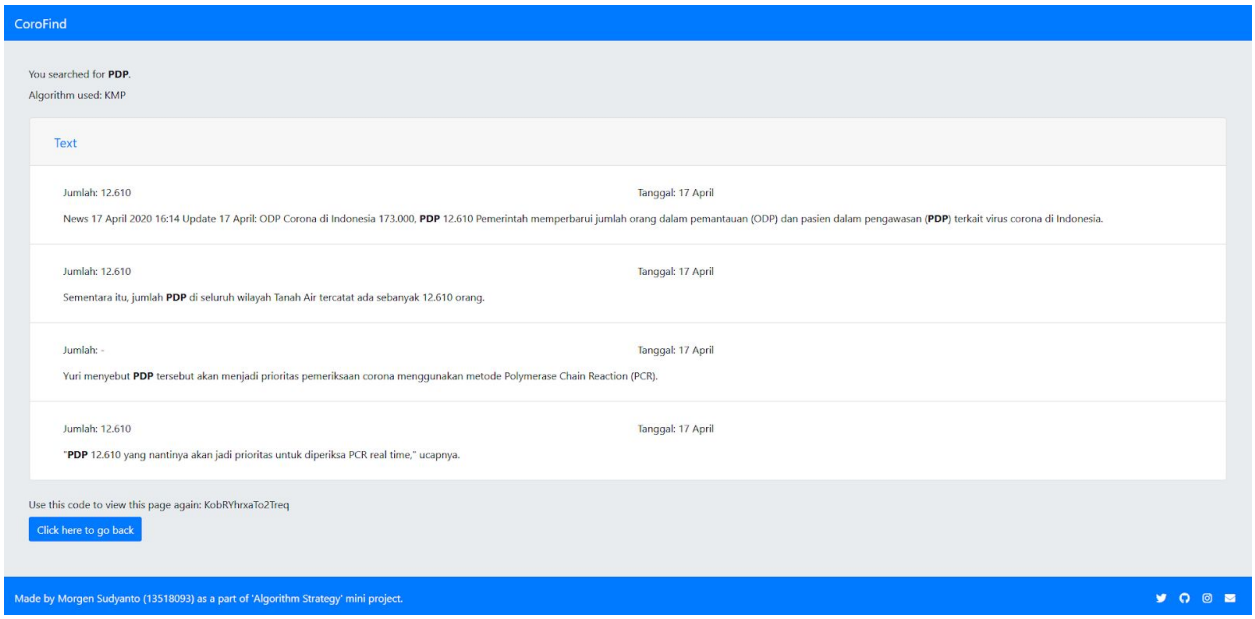
A. file: "kumparan1.txt" (di copy-paste)

B. keyword: PDP

C. algoritma: KMP



Gambar 3.9 Tampilan input dengan text



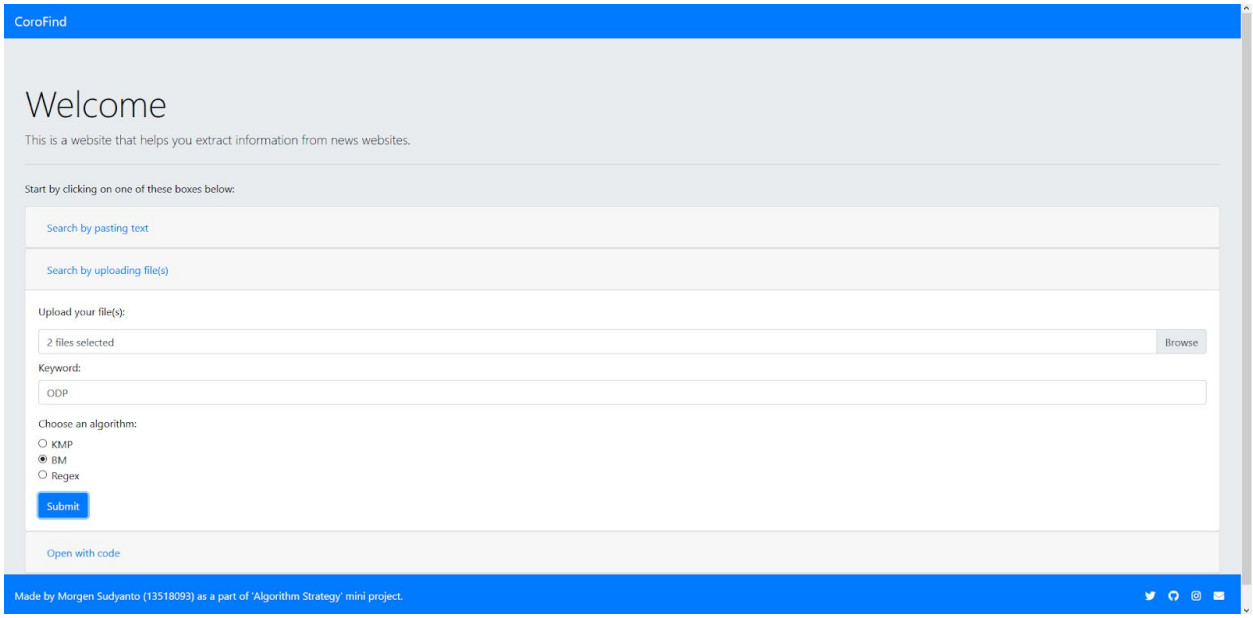
Gambar 3.10 Tampilan output

V. Input dengan file

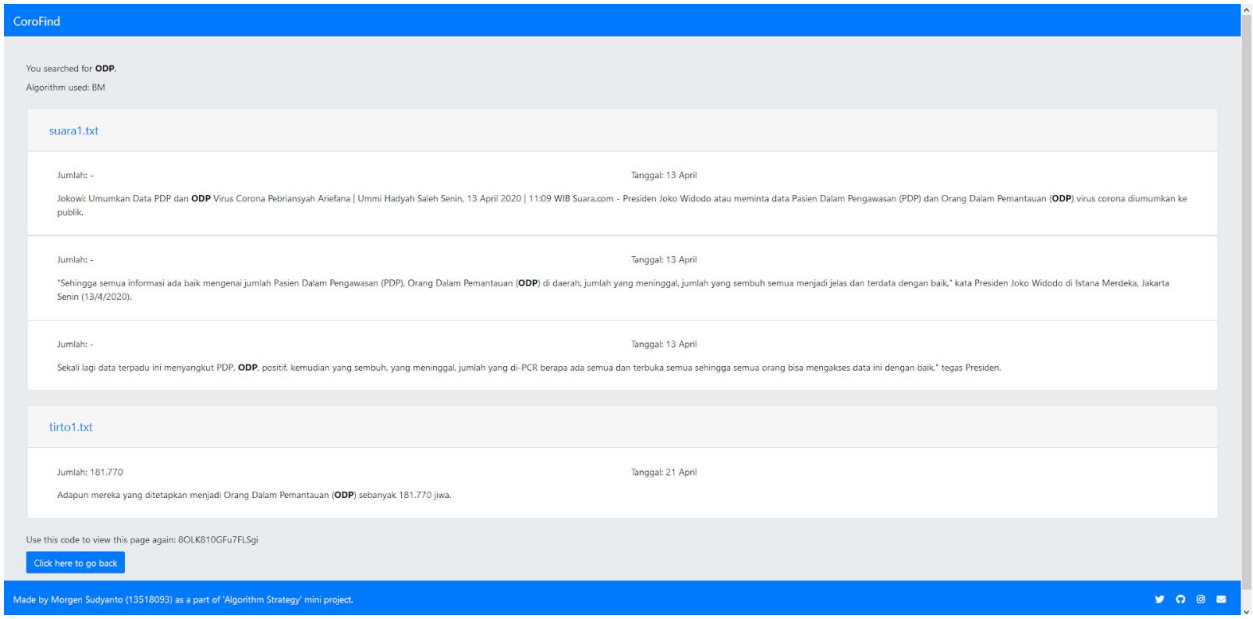
A. file: "suara1.txt" "tirto1.txt"

B. keyword: ODP

C. algoritma: BM

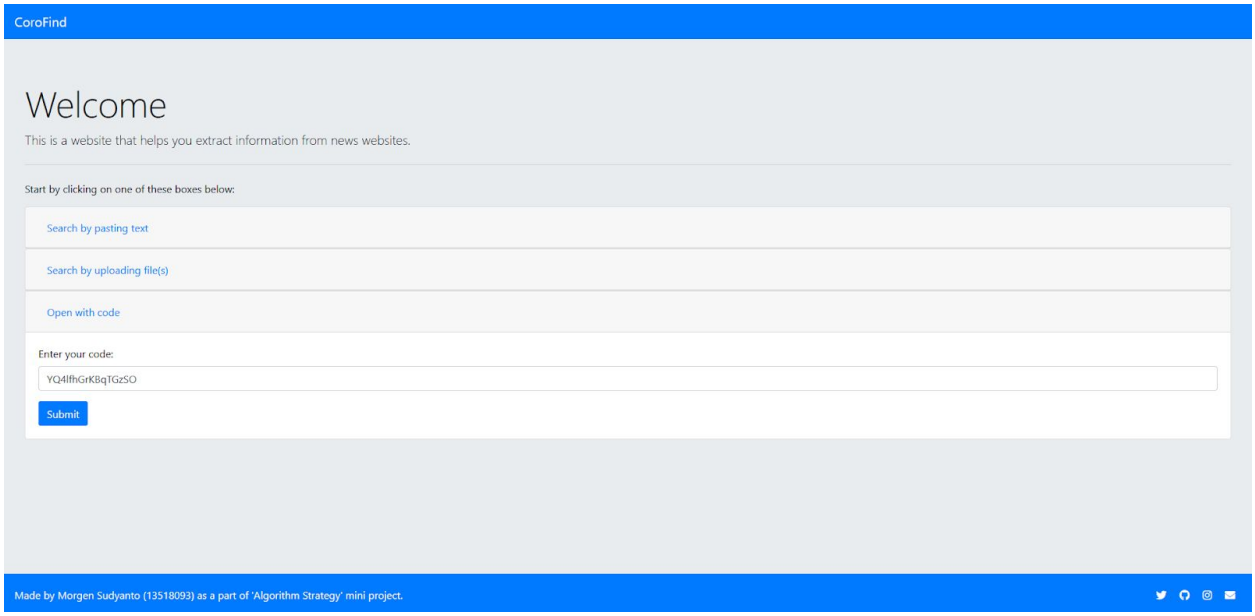


Gambar 3.11 Tampilan input dengan file

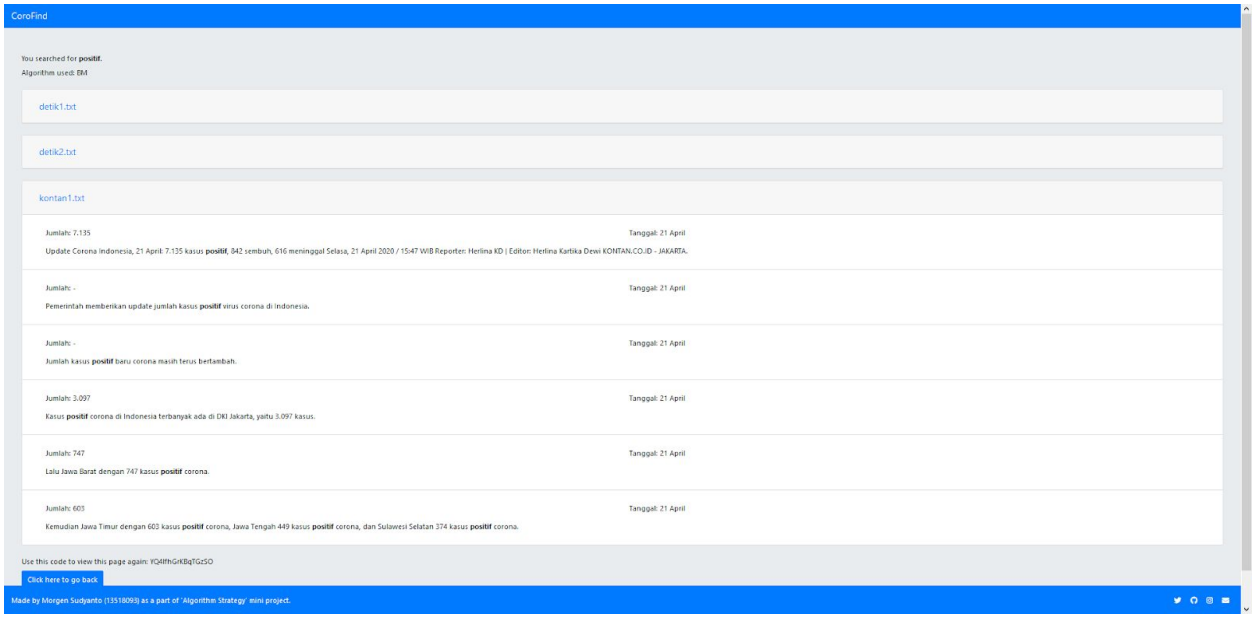


Gambar 3.12 Tampilan output

VI. Input dengan menggunakan kode yang didapat pada tes II (YQ4lfhGrKBqTGzSO)



Gambar 3.13 Tampilan input dengan kode



Gambar 3.14 Tampilan output. Hasil ini sama seperti Gambar 3.5 dan 3.6

BAB IV

CHECKLIST KEBERHASILAN PROGRAM

Poin	Ya	Tidak
1. Program berhasil dikompilasi	V	
2. Program berhasil running	V	
3. Program dapat menerima input dan menuliskan output.	V	
4. Luaran sudah benar untuk data uji	V	

SUMBER

Wibisono, Yudi dan Khodra, Masayu Leylia (2020). Modul Praktikum Kuliah Pengantar Regular Expression. Diakses pada 21 April 2020.