

CHAPTER 5

IMPLEMENTATION AND TESTING

5.1 Implementation

5.1.1. Term Frequency – Inverse Document Frequency

This chapter will explain the implementation in the program for analysis. The previous dataset has to go through the text pre-processing stage and after that it calculates the TF-IDF calculation.

The calculation of TF-IDF must calculate the frequency term of each document then look for IDF results and finally look for TF-IDF results.

Like the example image below. Figure 5.1 is an image of the program looking for the value of the frequency term, frequency document, and IDF.

```
public function pembobotan_kata()
{
    $l=0;
    $table1=array();
    $search=array();
    foreach ($this->stopword_remove as $key) {
        if (array_search(trim(strtolower($key)), $search)===false) {
            $dok=0;
            $table1[$l]['term']=trim(strtolower($key));
            $table1[$l]['dok']=array();

            foreach ($this->dokumen as $key1) {
                array_push($table1[$l]['dok'], substr_count(trim(strtolower($key1)), trim(strtolower($key))));

                ++$dok;
            }

            $table1[$l]['df']=array_sum($table1[$l]['dok']);
            $table1[$l]['Ddf']=count($table1[$l]['dok'])/$table1[$l]['df'];
            $table1[$l]['idf']=round(log10($table1[$l]['Ddf']), 3);
            $table1[$l]['idf1']= round($table1[$l]['idf']+1, 3);
            ++$l;
        }
        array_push($search, trim(strtolower($key)));
    }
    $this->table1=$table1;
    // echo json_encode($table1);
}
```

Image 5.1 Calculate TF-IDF

Is an empty array named search and table1. Converts the word to lowercase, where it returns the sum of all the values in the array and counts them. Then eliminate words that often appear, noise so that the process is fast.

```

public function pembobotan_kalimat()
{
    $bobot_dokumen=array();
    $y=0;
    foreach ($this->dokumen as $key1) {
        $bobot_dokumen[$y]['a']=array();
        foreach ($this->table1 as $key2) {
            // echo $key2['dok'][$y] ;
            if ($key2['dok'][$y]>0) {
                array_push($bobot_dokumen[$y]['a'], $key2['dok'][$y]*$key2['idf1']);
            } else {
                array_push($bobot_dokumen[$y]['a'], 0);
            }
        }
        $bobot_dokumen[$y]['jml']=round(array_sum($bobot_dokumen[$y]['a']), 3);
        ++$y;
    }
    $this->table2=$bobot_dokumen;
}

```

Image 5.2 TF-IDF

Is an empty array named document weights. Entering data into the desired array and then counting then numbers are rounded if the numbers are commas and added up. The TF value is calculated by the formula $TF = \text{number of word frequencies} / \text{number of words}$, $IDF = \log(\text{number of documents} / \text{number of word frequencies})$.

5.1.2 Implement Cosine Similarity Algorithm

```

autoreply2.php
85 //Cosine Similarity
86 $dot = Similarity::dot2($split); //manggil function dot2
87
88
89 $target1 = array('ruang');
90 $target2 = array('jam');
91 $target3 = array('hari');
92
93 $nilai1 = Similarity::cosine($target1, $split, $dot); //manggil function cosine
94 $nilai2 = Similarity::cosine($target2, $split, $dot);
95 $nilai3 = Similarity::cosine($target3, $split, $dot);
96
97
98 if($nilai1>$nilai2 && $nilai1>$nilai3){
99     $kategori2='ruang';
100 }
101 if($nilai2>$nilai1 && $nilai2>$nilai3){
102     $kategori2='jam';
103 }
104 if($nilai3>$nilai1 && $nilai3>$nilai2){
105     $kategori2='hari';
106 }else{
107     if(strchr($text, 'ruang') == true){ //strchr itu mencari kata yg diinginkan
108         $kategori2 = 'ruang';
109     }else if(strchr($text, 'jam') == true){
110         $kategori2 = 'jam';
111     }else if(strchr($text, 'hari') == true){
112         $kategori2 = 'hari';
113     }else{
114         $kategori2='kosong';
115     }
116 }

```

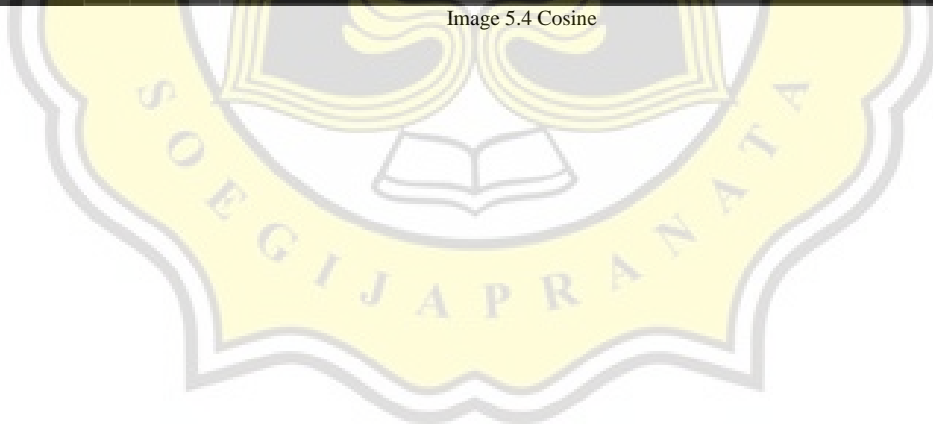
Image 5.3 Cosine

```

118 //menampung dataset makul
119 $query = "SELECT makul FROM sms_jadwalmakul";
120 $hasil = mysqli_query($mysqli,$query);
121 $makulArr=array();
122 while ($data = mysqli_fetch_array($hasil))
123 {
124     $makul = $data['makul']; //ngambil data kolom makul
125     // $msgArr2 = array_search($makul,);
126
127     // print_r($msgArr2);
128     array_push($makulArr,$makul);
129
130 }
131
132 $makArr=[];
133 foreach ($makulArr as $mak) {
134     if (str_contains(strtolower($msgArr[0]), strtolower($mak))) {
135         array_push($makArr,$mak);
136     }
137 } //133-137 mencari makul didatabase dengan yang ditanyakan ada atau tidak
138
139
140 $i=0;
141 $katArr=[[ $kategori2]];
142 $hasilreply=[];
143 if($katArr!=[]){
144     // jadwal makul
145
146     foreach ($katArr as $kat) {
147
148         if (in_array("ruang", $kat))
149         {

```

Image 5.4 Cosine



```

150     $query = "SELECT ruang FROM sms_jadwalmakul WHERE makul='$makArr[0]' LIMIT 1";
151     $result = $mysqli -> query($query) or die($mysqli->error); //memproses query yg diatasnya
152     $reply = $result -> fetch_assoc(); //nampilin satu data
153     array_push($hasilreply,$reply);
154
155 }
156 else if (in_array("jam", $kat))
157 {
158     $query = "SELECT jam FROM sms_jadwalmakul WHERE makul='$makArr[0]' LIMIT 1";
159     $result = $mysqli -> query($query) or die($mysqli->error);
160     $reply = $result -> fetch_assoc();
161     array_push($hasilreply,$reply);
162 }
163 else if (in_array("hari", $kat))
164 {
165     $query = "SELECT hari FROM sms_jadwalmakul WHERE makul='$makArr[0]' LIMIT 1";
166     $result = $mysqli -> query($query) or die($mysqli->error);
167     $reply = $result -> fetch_assoc();
168     array_push($hasilreply,$reply);
169 }
170 else
171 {
172     $reply = [];
173     array_push($hasilreply,$reply);
174 }
175
176
177 if (!isset($noHpArr[$i]) || !isset($idArr[$i]) || !isset($hasilreply[0])) { //ngecek nohp,idarr,
178     return; //kalau ada isi memproses no 180
179 } else {
180     $a=$hasilreply[0]; //ngambil data pertama kalinya
181

```

Image 5.5 Cosine

```

182 if($a==' ' || $a==null){
183     $query3 = "INSERT INTO outbox(DestinationNumber, TextDecoded) VALUES ('$noHpArr[$i]', 'Maaf Perintah Salah') LIMIT 1";
184     $hasil3 = mysqli_query($mysqli,$query3);
185
186     $query4 = "UPDATE inbox SET Processed = 'true' WHERE ID = '$idArr[$i]'";
187     $hasil4 = mysqli_query($mysqli,$query4);
188     echo
189     ('NOMOR : '.$noHpArr[$i].' TELAH BERHASIL DIKIRIM.'.' '$idArr[$i].' False <br>');
190 }else{
191     $b=$hasilreply[0][$kat[0]];
192     $query3 = "INSERT INTO outbox(DestinationNumber, TextDecoded) VALUES ('$noHpArr[$i]', '$b') LIMIT 1";
193     $hasil3 = mysqli_query($mysqli,$query3);
194
195     $query4 = "UPDATE inbox SET Processed = 'true' WHERE ID = '$idArr[$i]'";
196     $hasil4 = mysqli_query($mysqli,$query4);
197
198     echo
199     ('NOMOR : '.$noHpArr[$i].' TELAH BERHASIL DIKIRIM.'.' '$idArr[$i].' True <br>');
200
201 }
202 }
203 }
204 $i++;
205 }
206 }else{
207     echo '<script type="text/javascript">';
208     echo 'alert("Semua pesan telah diproses");';
209     echo 'window.location.href = "../media.php";';
210     echo '</script>';
211 }

```

Image 5.6 Cosine

```

1  <?php
2  class Similarity {
3      protected function dot($tags) {
4          $tags = array_unique($tags);
5          $tags = array_fill_keys($tags, 0);
6          ksort($tags);
7          return $tags;
8      }
9      static public function dot2($tags) {
10         $tags = array_unique($tags);
11         $tags = array_fill_keys($tags, 0);
12         ksort($tags);
13         return $tags;
14     }
15     static public function dot_product($a, $b) {
16         $products = array_map(function($a, $b) {
17             return $a * $b;
18         }, $a, $b);
19         return array_reduce($products, function($a, $b) {
20             return $a + $b;
21         });
22     }
23     static public function magnitude($point) {
24         $squares = array_map(function($x) {
25             return pow($x, 2);
26         }, $point);
27         return sqrt(array_reduce($squares, function($a, $b) {
28             return $a + $b;
29         }));
30     }

```

Image 5.7 Cosine

```

31     static public function cosine($a, $b, $base) {
32         $a = array_fill_keys($a, 1) + $base;
33         $b = array_fill_keys($b, 1) + $base;
34         ksort($a);
35         ksort($b);
36         return self::dot_product($a, $b) / (self::magnitude($a) * self::magnitude($b));
37     }
38 }

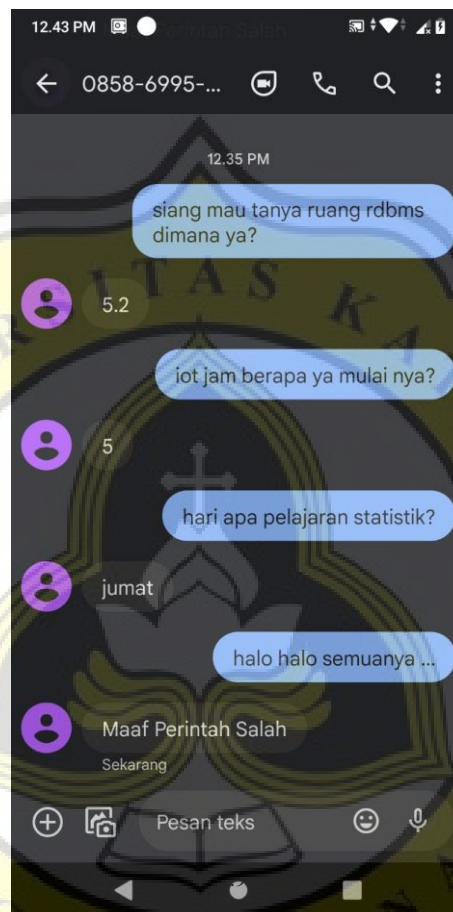
```

Image 5.8 Cosine

The explanation from image 5.3-5.8 firstly calls the dot2 function then creates a target with an array in which space, day and hour. Then call the cosine function itself, if the value 1 > value 2 and value 1 > value 3 the result is "room". If the value 2 > value 1 and value 2 > value 3 then the result is "hour". If the value 3 > value 1 and the value 3 > value 2 then the result is "days" but if outside of that then the category is empty. Then accommodate the makul dataset

then match the makul in the database whether it is the same as what was asked by the student, if it is the same it will be processed and sent the answer. But if none of the 3 categories is the same it will get "sorry wrong command".

5.2 Testing



Researchers have conducted trials on this project. If there are incoming questions from students about the room, the student will get the answer that is in accordance with what he wants. Likewise with the day and time, students will also get answers automatically which of course will be easily understood by students. But if students ask questions outside of the day/room/hour, they will still get an answer but "sorry, wrong command". If students also ask for 2 or more categories, they will still be processed, but only the first category will appear first and course this web application can also provide important information. In this testing using 12 question data where after being calculated using cosine the results were 75% accuracy.

No	Questions	Actual results	Prediction results	Status
1	ruang utk jaringankomputer dimana ya	ruang	5.3	benar
2	ruang multimediasbisnis dimana kak?	ruang	5.1	benar
3	jam berapa utk komputerisasiakuntansi	jam	1	benar
4	halo halo semuanya ...	maaf perintah salah	maaf perintah salah	benar
5	hari apa pelajaran statistik	hari	jumat	benar
6	iot jam berapa ya mulai nya?	jam	5	benar
7	siang mau tanya ruang rbms dimana ya?	ruang	5.2	benar
8	halo spada	maaf perintah salah	8	salah
9	iot hari apa ya	hari	array	salah
10	testing 3juni22	maaf perintah salah	maaf perintah salah	benar
11	oop hari apa ya saya lupa?	hari	kamis	benar
12	bahasainggris hari apa ya kak	hari	9	salah

Prediction Accuracy	benar 75%
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