LAMPIRAN

LAMPIRAN A. CODE PYTHON ENKRIPSI

```
import scipy.io.wavfile
import numpy
from tqdm import tqdm
import time
import matplotlib.pyplot as plt
import sys
import wave
import subprocess
from tkinter.filedialog import askopenfilename
from tkinter.ttk import *
from tkinter import *
from tkinter import filedialog
from tkinter import messagebox
from Crypto.Cipher import AES
import os
import random
import struct
import string

#TODO random.randint() from Enaudio.py
audio_window = Tk()
audio_window.geometry ( '360x200' )
audio_window.title ('Enkripsi Audio AES')

def goback():
        exit()

def powmod(b, e, m):
        b2 = b
```

```
        res = 1
        while e:
                if e & 1:
                        res = (res * b2) % m
                b2 = (b2*b2) % m
                e >>= 1
        return res

def signaltonoise_dB(a, axis=0, ddof=0):
    a = numpy.asanyarray(a)
    m = a.mean(axis)
    sd = a.std(axis=axis, ddof=ddof)
    return 20*numpy.log10(abs(numpy.where(sd == 0, 0, m/sd)))

def enfinish8():
        messagebox.showinfo('Sukses!', 'Proses enkripsi selesai')

def print_time(time):
    day = time // (24 * 3600)
    time = time % (24 * 3600)
    hour = time // 3600
    time %= 3600
    minutes = time // 60
    time %= 60
    seconds = time
    return "%d menit %d detik" % (minutes, seconds)

def encrypt_file(key, filename, chunk_size=64*1024):
    output_filename = filename + '(terenkripsi).wav'
    iv = os.urandom(16)
    encryptor = AES.new(key, AES.MODE_CBC, iv)
```

```
    filesize = os.path.getsize(filename)
    with open(filename, 'rb') as inputfile:
        with open(output_filename, 'wb') as outputfile:
            outputfile.write(struct.pack('<Q', filesize))
            outputfile.write(iv)
            while True:
                chunk = inputfile.read(chunk_size)
                if len(chunk) == 0:
                    break
                elif len(chunk) % 16 != 0:
                    chunk += b' ' * (16 - len(chunk) % 16)
                outputfile.write(encryptor.encrypt(chunk))
def eight_encrypt():
        start = time.time()
        #buka file dan baca data
        filename = askopenfilename(initialdir = "/users/angel/aesaudio/inputaudio",
title = "Pilih Rekaman", filetypes = (("wav files", "*.wav"),))
        foo = wave.open(filename, 'rb')
        channels = foo.getnchannels()
        FS = foo.getframerate()
        fs, data = scipy.io.wavfile.read(filename)
        Time= numpy.linspace(0, len(data)/fs, num=len(data))

        #generate secret key dengan cara random huruf kecil besar disertai angka
dengan panjang karakter = 16
        secret_key = ''.join(random.choices(string.ascii_letters + string.digits,
k=16))
        print(secret_key)
        with open(filename+"-secret.txt", "w") as text_file:
                text_file.write(secret_key)

        #Proses Encryption
```

```
    dataarray = data
    print(type(dataarray))
    a, b = dataarray.shape
    tup = (a, b)
    data = data.astype(numpy.int16)
    channel = data[:, 0]
    data.setflags(write=1)
    print((a,b))
    plt.figure(1)
    plt.title('Original Signal Wave')
    plt.plot(Time, data)
    plt.show()
    snr = signaltonoise_dB(channel)
    print('Nilai SNR Sebelum Enkripsi : ',snr) #Nilai diatas 20DB dinilai baik,
tidak ada/hanya sedikit noise.
    for i in range(0, tup[0]):
        for j in range(0, tup[1]):
            x = data[i][j]
            x = ((pow(x,3)) % 25777)
            data[i][j] = x
    encrypt_file(secret_key, filename)
    plt.figure(2)
    plt.title('Encrypted Signal Wave')
    plt.plot(Time, data)
    plt.show()

    end = time.time()
    ElspTime = (end-start)
    subprocess.Popen(r'explorer "C:\Users\Angel\AESaudio\inputaudio\"')
    print('\n Proses berlangsung selama', print_time(ElspTime))
    enfinish8()
```

```
#pembuatan gui
btn_8_encrypt = Button( audio_window, text = "Enkripsi Audio", command =
eight_encrypt)
btn_8_encrypt.place( x=125, y=50 )
btn_exit = Button( audio_window, text = "Keluar" , command = goback).place(
x=125, y=150 )

audio_window.mainloop()
```

LAMPIRAN B. KODE DEKRIPSI

```
import scipy.io.wavfile
import numpy
import scipy as sp
from scipy.signal import butter, lfilter, freqz, filtfilt
from scipy.io.wavfile import read
from scipy.io.wavfile import write     # Imported libaries such as numpy,
scipy(read, write), matplotlib.pyplot
from scipy import signal
from tqdm import tqdm
import time
import matplotlib.pyplot as plt
import sys
import wave
import subprocess
from tkinter.filedialog import askopenfilename
from tkinter.ttk import *
from tkinter import *
from tkinter import filedialog
from tkinter import messagebox
import os
import struct
from Crypto.Cipher import AES

#Definisi Gui ukuran gui
audio_window = Tk()
audio_window.geometry ( '360x200' )
audio_window.title ('Dekripsi Audio AES')

def goback():
        exit()
```

```
#fungsi enkripsi
def decrypt_file(key, filename, chunk_size=24*1024):
    output_filename = os.path.splitext(filename)[0]+'(terdekripsi).wav'
    with open(filename, 'rb') as infile:
        origsize = struct.unpack('<Q', infile.read(struct.calcsize('Q')))[0]
        iv = infile.read(16)
        decryptor = AES.new(key, AES.MODE_CBC, iv)
        with open(output_filename, 'wb') as outfile:
            while True:
                chunk = infile.read(chunk_size)
                if len(chunk) == 0:
                    break
                outfile.write(decryptor.decrypt(chunk))
            outfile.truncate(origsize)
        fln = askopenfilename(initialdir = "/users/angel/aesaudio/inputaudio", title
= "Pilih Rekaman untuk difilter", filetypes = (("wav files", "*.wav"),))
        fs, data = scipy.io.wavfile.read(fln)
        channel = data[:, 0]
        snr_sebelum = signaltonoise_dB(channel)
        print('SNR Sebelum Filter', snr_sebelum)
        data = numpy.asarray(data, dtype=numpy.uint8)
        print(data)
        plt.plot(data)
        plt.title('Signal Sebelum difilter')
        plt.xlabel('Frequency(Hz)')
        plt.ylabel('Amplitude')
        plt.show()
        filter_lowpass(fln,fs,data)

def print_time(time):
        day = time // (24 * 3600)
        time = time % (24 * 3600)
```

```
        hour = time // 3600
        time %= 3600
        minutes = time // 60
        time %= 60
        seconds = time
        return "%d menit %d detik" % (minutes, seconds)

def butter_lowpass(cutoff, fs, order=5):
    nyq = 0.5 * fs
    normal_cutoff = cutoff / nyq
    b, a = butter(order, normal_cutoff, btype='low', analog=False)
    return b, a


def butter_lowpass_filter(data, cutoff, fs, order=5):
    b, a = butter_lowpass(cutoff, fs, order=order)
    y = lfilter(b, a, data)
    return y

def filter_lowpass(filename,freq,arr):
        left = arr[:, 0]
        right = arr[:, 1]
        monosound = numpy.mean(numpy.array([left, right]), axis=0)
        print("freq", freq)
        nyq = 0.5 * freq
        cutoff = 3000
        normal_cutoff = cutoff/nyq
        newFilteredSignal = butter_lowpass_filter(monosound, cutoff, freq, 5)
        plt.plot(newFilteredSignal) # plotting the signal.
        plt.title('Setelah menggunakan Lowpass Filter')
        plt.xlabel('Frequency(Hz)')
        plt.ylabel('Amplitude')
```

```
        plt.show()
        snr_setelah = signaltonoise_dB(newFilteredSignal)
        print('SNR Setelah Filter', snr_setelah)
        outname=os.path.splitext(filename)[0]+"(difilter).wav"
        write(outname, freq, newFilteredSignal.astype(numpy.uint8))

def filenameerror():
            messagebox.showinfo('Terjadi Kesalahan!', 'Silahkan pilih file audio 8bit')

def definish():
            messagebox.showinfo('Sukses!', 'Proses dekripsi selesai')

def signaltonoise_dB(a, axis=0, ddof=0):
    a = numpy.asanyarray(a)
    m = a.mean(axis)
    sd = a.std(axis=axis, ddof=ddof)
    return 20*numpy.log10(abs(numpy.where(sd == 0, 0, m/sd)))

def eight_decrypt():

            try:
                #proses baca data
                filename = askopenfilename()
                secret_key = secret_entry.get()
                start = time.time()

                #Proses Dekripsi
                decrypt_file(secret_key, filename)

                end = time.time()
                ElspTime = (end-start)
                print('\n Proses membutuhkan waktu selama ', print_time(ElspTime))
```

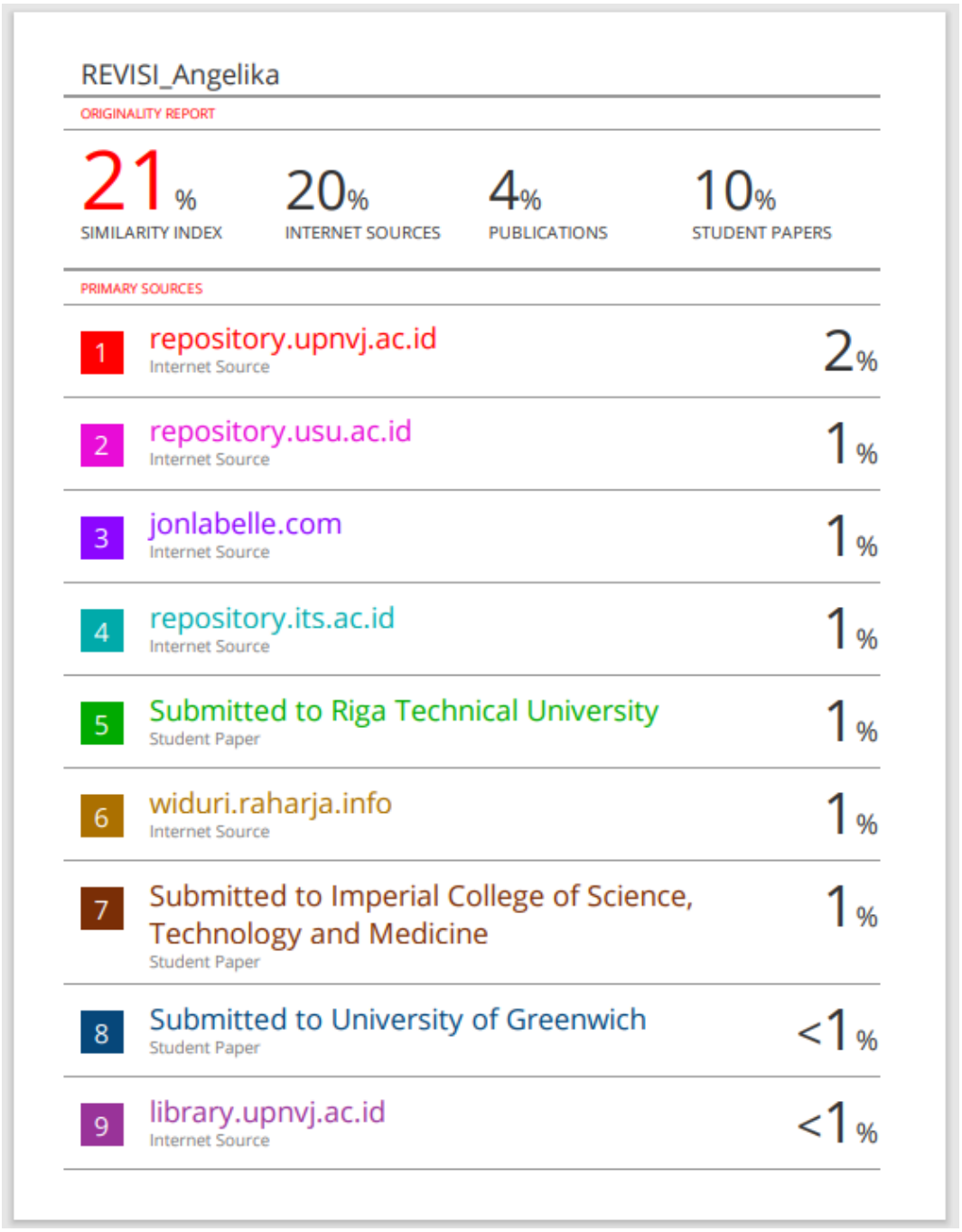
```
            definish()

        except TypeError:
            filenameerror()

        except AttributeError:
            filenameerror()
#pemuatan gui
label2 = Label(audio_window, text='Secret Key')
label2.place(x=20, y=20)
secret_entry = Entry (audio_window)
secret_entry.place(x=20, y=50)
btn_8_decrypt = Button( audio_window, text = "Dekripsi Audio", command =
eight_decrypt)
btn_8_decrypt.place(x=140, y=100)
btn_exit = Button( audio_window, text = "Keluar" , command = goback).place(
x=140, y=150 )

audio_window.mainloop()
```

LAMPIRAN C. TURNITIN



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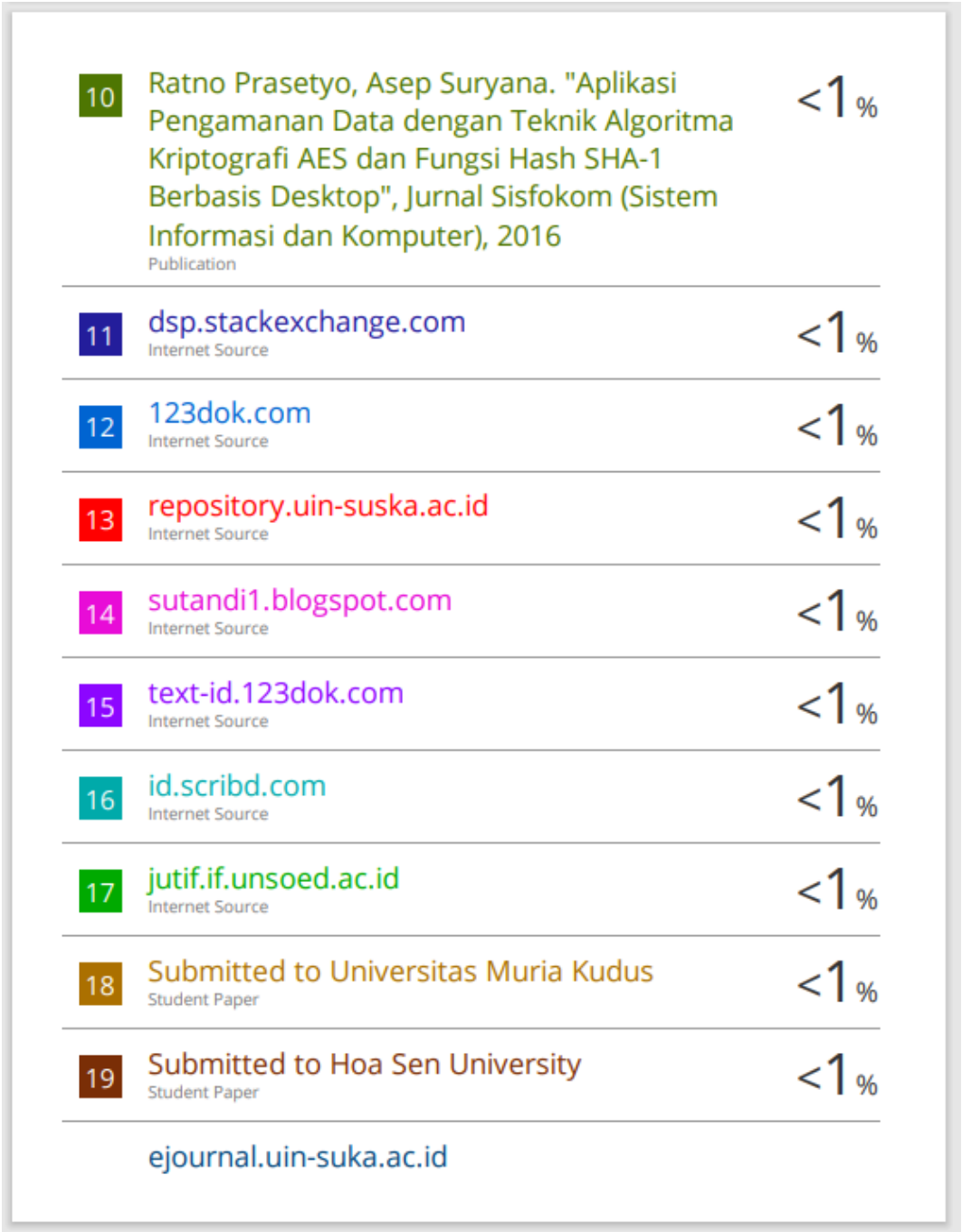

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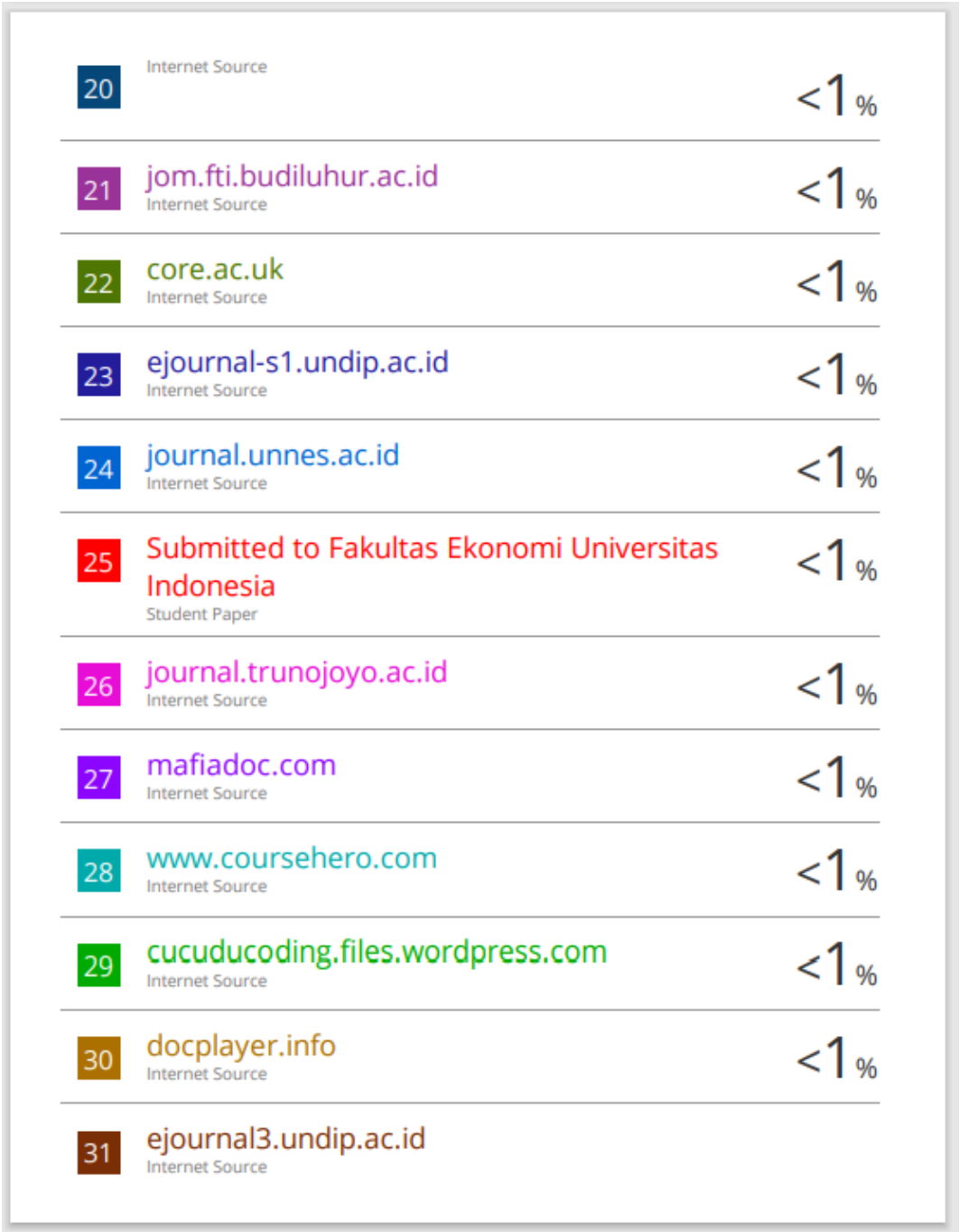

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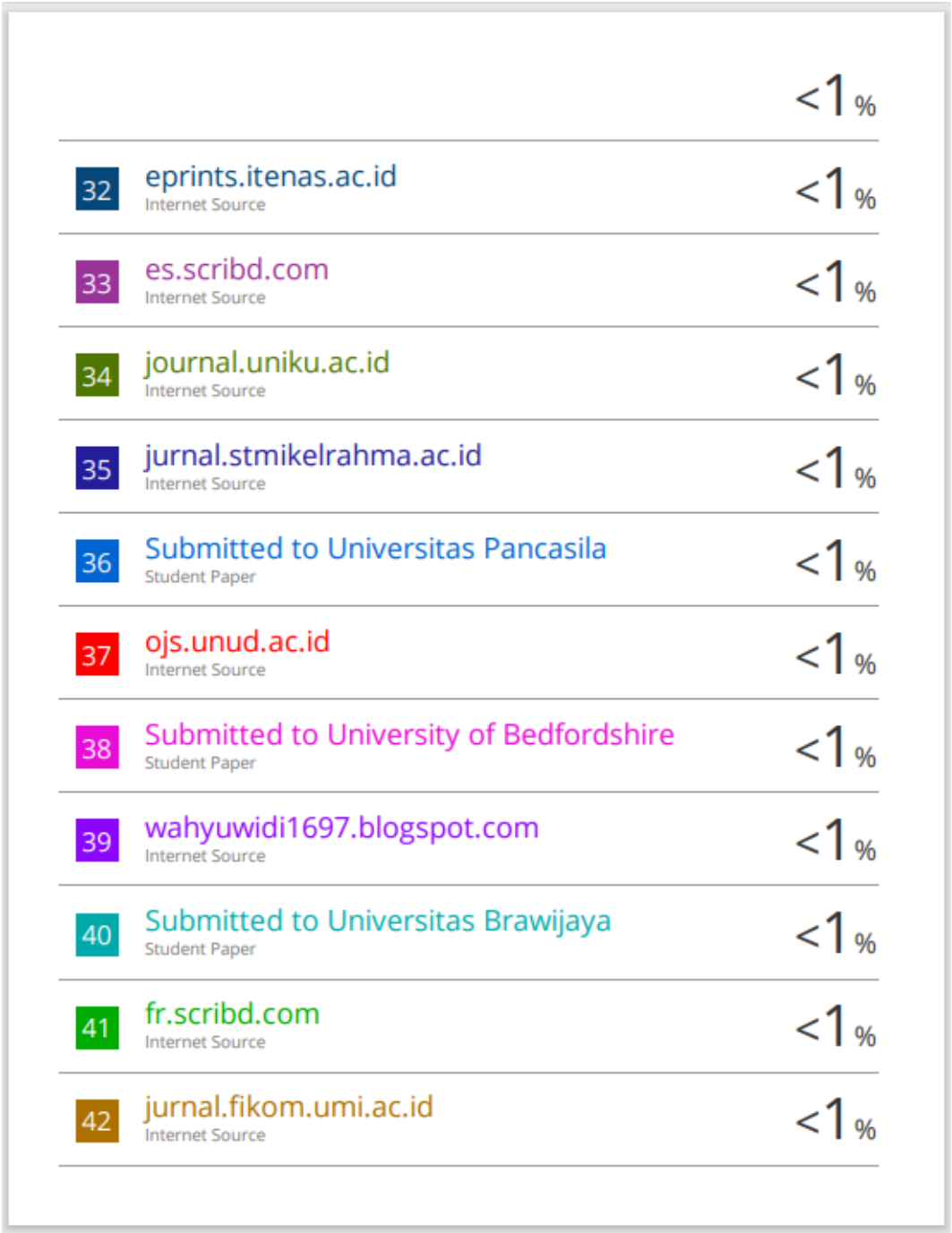

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