KEMENTERIAN PENDIDIKAN, KEBUDAYAAN, RISET DAN TEKNOLOGI
POLITEKNIK NEGERI MALANG
JURUSAN TEKNOLOGI INFORMASI
Jl. Soekarno Hatta No.9 Malang 65141
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Class : 2I / TI
Course : Computational Statistics

1. List videos

a. https://www.youtube.com/watch?v=MeVl09sVIes
b. https://www.youtube.com/watch?v=N77ivUK8DyM
c. https://www.youtube.com/watch?v=Q5bX5K76Hag
d. https://www.youtube.com/watch?v=_0HdaSW4E-w
e. https://www.youtube.com/watch?v=9ldOuVuas1c
f. https://www.youtube.com/watch?v=Ri7-vnrJD3k
g. https://www.youtube.com/watch?v=UcWal5F-WcQ
h. https://www.youtube.com/watch?v=hGNewhSUFjU
i. https://www.youtube.com/watch?v=sKGRcjzODVY
j. https://www.youtube.com/watch?v=NKYS8iWIYpg

Additional Video List by Faricha Aulia:

k. https://youtu.be/no9p96hKQAM
l. https://youtu.be/fkny5fhm38U
m. https://youtu.be/-YB4vETBdKo
n. https://youtu.be/Ljkzx7wuhLg
o. https://youtu.be/5J_IYcIfQds

2. List the hand signals from analyzing the list of YouTube videos

Answer:

No	Artist	Title	Time
1.	Ariel	Tegar	2:35
2.	Ariel	Tegar	3:24
3.	Chris Martin	Viva La Vida	3:07
4.	Adele	Set Fire To The Rain	1:51
5.	Adele	Set Fire To The Rain	3:26
6.	Adele	Set Fire To The Rain	3:42
7.	Ari Lasso	Hampa	2:11
8.	Ari Lasso	Hampa	7:16
9.	Reza Artamevia	Biar Menjadi kenangan	0:46
10	Reza Artamevia	Biar Menjadi kenangan	1:28
11.	Reza Artamevia	Biar Menjadi kenangan	2:20
12.	Celine Dion	the power of love	2:03
13.	Katy Perry	Roar	0:45
14.	Katy Perry	Roar	2:46
15.	Katy Perry	Roar	2:53
16.	Katy Perry	Roar	2:56
17.	Katy Perry	Roar	3:53
18.	Katy Perry	Firework	5:41

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No	Artist	Title	Time
19.	Katy Perry	Firework	6:13
20.	Katy Perry	Firework	6:43
21.	Rossa, Padi Reborn	Terlanjur Cinta	0:18
22.	Jemimah	Cinta Dalam Hati (Ungu)	1:18
23.	Lesti	Zapin Melayu	1:06
24.	Lesti	Zapin Melayu	2:28
25.	Lesti	Zapin Melayu	3:20
26.	Lyodra	Sang Dewi	4:04
27.	Lyodra	Pesan Terakhir	7:21
28.	Ariana Grande	Into You	1:45
29.	Fauozia	Minefields	0:17
30.	Fauozia	Minefields	0:35
31.	Mahalini	Melawan Restu	0:21

Processing the data in the table above

- Step 1 : I changed the minutes:seconds time format to an integer number to make it easier when analyzing/testing the data. Example: minute 2 second 35 change it to 235.
  Table after time modification:

No	Artist	Title	Time (modif)
1.	Ariel	Tegar	235
2.	Ariel	Tegar	324
3.	Chris Martin	Viva La Vida	307
4.	Adele	Set Fire To The Rain	151
5.	Adele	Set Fire To The Rain	326
6.	Adele	Set Fire To The Rain	342
7.	Ari Lasso	Hampa	211
8.	Ari Lasso	Hampa	716
9.	Reza Artamevia	Biar Menjadi kenangan	46
10	Reza Artamevia	Biar Menjadi kenangan	128
11.	Reza Artamevia	Biar Menjadi kenangan	220
12.	Celine Dion	the power of love	203
13.	Katy Perry	Roar	45
14.	Katy Perry	Roar	246
15.	Katy Perry	Roar	253
16.	Katy Perry	Roar	256
17.	Katy Perry	Roar	353
18.	Katy Perry	Firework	541
19.	Katy Perry	Firework	613
20.	Katy Perry	Firework	643
21.	Rossa, Padi Reborn	Terlanjur Cinta	018
22.	Jemimah	Cinta Dalam Hati (Ungu)	118
23.	Lesti	Zapin Melayu	106
24.	Lesti	Zapin Melayu	228

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No	Artist	Title	Time (modif)
25.	Lesti	Zapin Melayu	320
26.	Lyodra	Sang Dewi	404
27.	Lyodra	Pesan Terakhir	721
28.	Ariana Grande	Into You	145
29.	Fauozia	Minefields	17
30.	Fauozia	Minefields	35
31.	Mahalini	Melawan Restu	21

3. State your hyphoteses

Answer:

- Null Hypothesis (H_0): There is no significant difference in audio handsign duration between the outsider and local singer groups.
- Alternative Hypothesis (H_1): There is a significant difference in audio handsign duration between the outsider and local singer groups.

4. Determine the mean, std, and total amount of sample!

Answer:

- Mean = 267.48

```
[6]  # Audio handsign time (already modified)
     ah_time = [235, 324, 307, 151, 326, 342, 211, 716, 46, 128, 220, 203, 45, 246,
                253, 256, 353, 541, 613, 643, 18, 118, 106, 228, 320, 404, 721, 145, 17, 35, 21]

     # Calculate mean
     mean = sum(ah_time) / len(ah_time)

     print("Mean:", mean)

     Mean: 267.48387096774195
```

- Standard Deviation = 199.38

```
[4]  # Calculate the difference between each audio handsign time and the mean, then square the result
     squared_difference = [(time - mean) ** 2 for time in ah_time]

     # Calculate the average of the squared differences
     squared_mean = sum(squared_difference) / len(ah_time)

     # Calculate the standard deviation
     standard_dev = math.sqrt(squared_mean)

     print("Standard Deviation:", standard_dev)

     Standard Deviation: 199.37804437440948
```

- Total amount of samples = 31

```
[5]  print("Total amount of samples:", len(ah_time))

     Total amount of samples: 31
```

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5. Define the z-score

Answer:

No	Artist	Title	Time (modif)	z-score
1.	Ariel	Tegar	235	- 0.16
2.	Ariel	Tegar	324	0.28
3.	Chris Martin	Viva La Vida	307	0.19
4.	Adele	Set Fire To The Rain	151	- 0.58
5.	Adele	Set Fire To The Rain	326	0.29
6.	Adele	Set Fire To The Rain	342	0.37
7.	Ari Lasso	Hampa	211	- 0.28
8.	Ari Lasso	Hampa	716	2.24
9.	Reza Artamevia	Biar Menjadi kenangan	46	- 1.11
10	Reza Artamevia	Biar Menjadi kenangan	128	- 0.69
11.	Reza Artamevia	Biar Menjadi kenangan	220	- 0.23
12.	Celine Dion	the power of love	203	- 0.32
13.	Katy Perry	Roar	45	- 1.11
-014.	Katy Perry	Roar	246	- 0.10
15.	Katy Perry	Roar	253	- 0.07
16.	Katy Perry	Roar	256	- 0.05
17.	Katy Perry	Roar	353	0.42
18.	Katy Perry	Firework	541	1.37
19.	Katy Perry	Firework	613	1.73
20.	Katy Perry	Firework	643	1.88
21.	Rossa, Padi Reborn	Terlanjur Cinta	018	- 1.25
22.	Jemimah	Cinta Dalam Hati (Ungu)	118	- 0.74
23.	Lesti	Zapin Melayu	106	- 0.80
24.	Lesti	Zapin Melayu	228	- 0.19
25.	Lesti	Zapin Melayu	320	0.26
26.	Lyodra	Sang Dewi	404	0.68
27.	Lyodra	Pesan Terakhir	721	2.27
28.	Ariana Grande	Into You	145	- 0.61
29.	Fauozia	Minefields	17	- 1.25
30.	Fauozia	Minefields	35	- 1.16
31.	Mahalini	Melawan Restu	21	- 1.23

Formula:

```
[9]  # Calculate the Z-score for each audio signature time
     z_scores = [(x - mean) / standard_dev for x in ah_time]

     # Displays the Z-score for each audio signature time
     for i, z in enumerate(z_scores):
         print("z-score for number", i+1, "in the modified time table:", z)
```

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6. By using confidence level 90%, state your conclusion! Is H_0 is accepted?

Answer:

I grouped the singers into two parts (overseas singers and local singers) in order to analyze the differences for hypothesis testing.

- Overseas singer

No	Artist	Title	Time (modif)
1.	Chris Martin	Viva La Vida	307
2.	Adele	Set Fire To The Rain	151
3.	Adele	Set Fire To The Rain	326
4.	Adele	Set Fire To The Rain	342
5.	Celine Dion	the power of love	203
6.	Katy Perry	Roar	45
7.	Katy Perry	Roar	246
8.	Katy Perry	Roar	253
9.	Katy Perry	Roar	256
10.	Katy Perry	Roar	353
11.	Katy Perry	Firework	541
12.	Katy Perry	Firework	613
13.	Katy Perry	Firework	643
14.	Ariana Grande	Into You	145
15.	Fauozia	Minefields	17
16.	Fauozia	Minefields	35

- Local singer

No	Artist	Title	Time (modif)
1.	Ariel	Tegar	235
2.	Ariel	Tegar	324
3.	Ari Lasso	Hampa	211
4.	Ari Lasso	Hampa	716
5.	Reza Artamevia	Biar Menjadi kenangan	46
6.	Reza Artamevia	Biar Menjadi kenangan	128
7.	Reza Artamevia	Biar Menjadi kenangan	220
8.	Rossa, Padi Reborn	Terlanjur Cinta	018
9.	Jemimah	Cinta Dalam Hati (Ungu)	118
10.	Lesti	Zapin Melayu	106
11.	Lesti	Zapin Melayu	228
12.	Lesti	Zapin Melayu	320
13.	Lyodra	Sang Dewi	404
14.	Lyodra	Pesan Terakhir	721
15.	Mahalini	Melawan Restu	21

Conclusion: Since the p-value (0.7341736416648448) is greater than α (0.10), it is concluded that the null hypothesis is accepted, which means that there is no significant difference between the audio handsign timing of overseas and local singers at the 90% confidence level.

The code on the next page 😊

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Formula:

```
[12] import scipy.stats as stats

     # Audio handsign time (modification) from overseas singers
     overseas = [307, 151, 326, 342, 203, 45, 246, 253, 256, 353, 541, 613, 643, 145, 17, 35]

     # Audio handsign time (modification) from local singer
     local = [235, 324, 211, 716, 46, 128, 220, 18, 118, 106, 228, 320, 404, 721, 21]

     # Perform independent t test
     t_statistic, p_value = stats.ttest_ind(overseas, local)

     # Displays the results of the t test
     print("T-Statistic:", t_statistic)
     print("P-Value:", p_value)

     alpha = 0.10

     if p_value < alpha:
         print("The null hypothesis is rejected.")
         print("There is a significant difference between overseas and local audio signature times at the
     else:
         print("The null hypothesis is accepted.")
         print("There is no significant difference between the audio signature time of overseas and local

     T-Statistic: 0.34286410223122227
     P-Value: 0.7341736416648448
     The null hypothesis is accepted.
     There is no significant difference between the audio signature time of overseas and local singers at
```

Here I include my google colab link so that the formula code for number 4 to 6 can be read clearly
https://colab.research.google.com/drive/1EYOPOGz8xscLEPlwgs87RRtpEcgS9lPi?usp=sharing