

Exp no:3c)

CROSS CORRELATION

Date :

AIM:

To compute and analyse cross correlation using python.

ALGORITHM:

1. Start
2. Input two signals : signal 1 and signal 2.
3. Reverse signal 2
4. Slide signal 2 over signal 1 and at each step multiply overlapping values , sum the result and store the result as the cross correlation values for each lag.
5. Repeat 4 for all possible lags.
6. Display the cross correlation result.
7. End

MATHEMATICAL EXPRESSION:

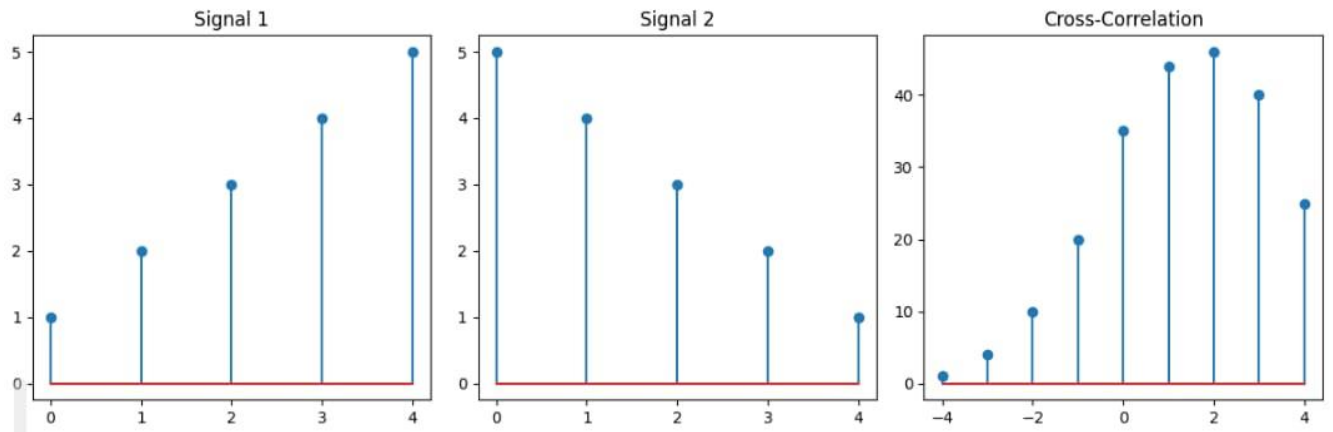
$$R = \sum_{k=0}^{n-1} X(k)h(k+n)$$

FLOW CHART:

PROGRAM:

```
import numpy as np
import matplotlib.pyplot as plt
# Step 2: Create two signals (arrays)
signal1 = np.array([1, 2, 3, 4, 5])
signal2 = np.array([5, 4, 3, 2, 1])
# Step 3: Compute cross-correlation using numpy
cross_corr = np.correlate(signal1, signal2, mode='full')
# Step 4: Display the signals and the cross-correlation result
lags = np.arange(-len(signal2) + 1, len(signal1))
plt.figure(figsize=(12, 4))
plt.subplot(1, 3, 1)
plt.stem(signal1)
plt.title("Signal 1")
plt.subplot(1, 3, 2)
plt.stem(signal2)
plt.title("Signal 2")
plt.subplot(1, 3, 3)
plt.stem(lags, cross_corr)
plt.title("Cross-Correlation")
plt.tight_layout()
plt.show()
```

OUTPUT:



RESULT:

The implement and analysis of cross correlation is and the output is plotted.