

DAILY ASSESSMENT FORMAT

| | | | |
|--------------------|---|---------------------|---------------------|
| Date: | 25-05-2020 | Name: | Rajeshwari Gadagi |
| Course: | Digital signal processing | USN: | 4AL17EC076 |
| Topic: | Introduction to fourier series & fourier transform, Inner product in Hilbert transform, Complex fourier series, Fourier series using matlab and python, Fourier series and gibbs phenomena using matlab | Semester & Section: | 6th sem 'B' section |
| Github Repository: | Rajeshwari-gadagi | | |

FORENOON SESSION DETAILS

Image of session

Fourier Series

$$\langle f(x), g(x) \rangle = \int_{-\pi}^{\pi} f(x) \bar{g}(x) dx$$

$$f(x) = \frac{A_0}{2} + \sum_{k=1}^{\infty} (A_k \cos(kx) + B_k \sin(kx))$$

$$A_k = \frac{1}{\pi} \int_{-\pi}^{\pi} f(x) \cos(kx) dx = \frac{1}{\pi} \langle f(x), \cos(kx) \rangle$$

$$B_k = \frac{1}{\pi} \int_{-\pi}^{\pi} f(x) \sin(kx) dx = \frac{1}{\pi} \langle f(x), \sin(kx) \rangle$$

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Fourier Series: Part 1

Fourier Series

$$\langle f(x), g(x) \rangle = \int_{-\pi}^{\pi} f(x) \bar{g}(x) dx$$

$$f(x) = \frac{A_0}{2} + \sum_{k=1}^{\infty} \left(A_k \cos\left(\frac{2\pi k x}{L}\right) + B_k \sin\left(\frac{2\pi k x}{L}\right) \right)$$

$$A_k = \frac{2}{L} \int_0^L f(x) \cos\left(\frac{2\pi k x}{L}\right) dx$$

$$B_k = \frac{2}{L} \int_0^L f(x) \sin\left(\frac{2\pi k x}{L}\right) dx$$

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$f(x) \in L_2(0,L)$

Fourier Series: Part 2

```

1 clear all, close all,clc
2
3 figure
4 set(gcf,'Position',[1500 200 2000 1200])
5
6 % Define domain
7 L = pi;
8 N = 1024;
9 dx = 1/(N-1);
10 x = -L:dx:L;
11
12 % Define hat function
13 f = 0*x;
14 f(1:N/2) = 4*[1:N/4-1]/N;
15 f(N/2+1:N/4) = 1-4*(0:N/4-1)/N;
16 plot(x,f,'-k','LineWidth',3.5), hold on
17
18 % Compute Fourier series
19 CC = jetc(20);
20 A0 = sum(f.*ones(size(x)))*dx/pi;
21 fFS = A0/2;
22 for k=1:20
23    fFS = fFS + sum(f.*cos(pi*k*x/L))+dx/pi; % Inner product
24    B(k) = sum(f.*sin(pi*k*x/L))/dx/pi;
25    fFS = fFS + A(k)*cos(k*pi*x/L) + B(k)*sin(k*pi*x/L);
26    plot(x,fFS,'-.', color,CC(k,:),'LineWidth',2)
27    pause(0.1)
28 end
29
30
31 % Plot amplitudes
32 figure; set(gcf,'Position',[1500 200 2000 1200])
33 clear ERR
34
35
36 f1>>

```

Fourier Series [Matlab]

Fourier Series $e^{ikx} = \cos(kx) + i\sin(kx)$ databookuw.com

$$\langle f(x), g(x) \rangle = \int_{-\pi}^{\pi} f(x) \bar{g}(x) dx$$

$$f(x) = \sum_{k=-\infty}^{\infty} C_k e^{ikx} = \sum_{k=-\infty}^{\infty} (c_{k+} + i\beta_k)(\cos(kx) + i\sin(kx))$$

$$(C_k = \overline{C_{-k}} \text{ if } f(x) \text{ real})$$




Complex Fourier Series

Fourier Series - part 1.

$$\langle f(x), g(x) \rangle = \int_a^b f(x) \bar{g}(x) dx$$

$$f(x) = A_0 + \sum_{k=1}^{\infty} (A_k \cos(kx) + B_k \sin(kx))$$


$$A_k = \frac{1}{\pi} \int_{-\pi}^{\pi} f(x) \cos(kx) dx = \frac{1}{\pi \|\cos(kx)\|} \langle f(x), \cos(kx) \rangle$$

$$B_k = \frac{1}{\pi} \int_{-\pi}^{\pi} f(x) \sin(kx) dx = \frac{1}{\pi \|\sin(kx)\|} \langle f(x), \sin(kx) \rangle$$

$$\vec{f} = \langle \vec{f}, \vec{x} \rangle \vec{x} + \langle \vec{f}, \vec{y} \rangle \vec{y}$$

$$= \langle \vec{f}, \vec{u} \rangle \vec{u} + \langle \vec{f}, \vec{v} \rangle \vec{v}$$


Fourier Series - part 2.

$$\langle f(x), g(x) \rangle = \int_a^b f(x) \bar{g}(x) dx$$

$$f(x) = \frac{A_0}{2} + \sum_{k=1}^{\infty} \left(A_k \cos\left(\frac{2\pi k x}{L}\right) + B_k \sin\left(\frac{2\pi k x}{L}\right) \right)$$

$$A_k = \frac{2}{L} \int_0^L f(x) \cos\left(\frac{2\pi k x}{L}\right) dx$$

$$B_k = \frac{2}{L} \int_0^L f(x) \sin\left(\frac{2\pi k x}{L}\right) dx$$

Inner Products in Hilbert Space

Fourier Transform (of wavelets)

$$\langle f(x), g(x) \rangle = \int_a^b f(x) \bar{g}(x) dx$$

$$f = \begin{bmatrix} f_1 \\ f_2 \\ \vdots \\ f_n \end{bmatrix}, \quad g = \begin{bmatrix} g_1 \\ g_2 \\ \vdots \\ g_n \end{bmatrix}$$

$$\langle f, g \rangle = g^T f$$

$$= \sum_{k=1}^n f_k g_k$$

$$\langle f, g \rangle \Delta x = \sum_{k=1}^n f(x_k) \bar{g}(x_k) \Delta x$$

Complex Fourier Series

$$e^{j\varphi x} = \cos(\varphi x) + i \sin(\varphi x) = \varphi$$

Fourier Series

$$\langle f(x), g(x) \rangle = \int_{-\pi}^{\pi} f(x) \bar{g}(x) dx$$

$$f(x) = \sum_{k=-\infty}^{\infty} c_k e^{jkx} = \sum_{k=-\infty}^{\infty} (a_k + j b_k)(\cos(kx) + j \sin(kx))$$

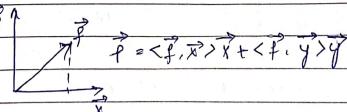
$$(c_k = \overline{c}_{-k} \text{ if } f(x) \text{ real})$$

$$\langle \psi_j, \psi_k \rangle = \int_{-\pi}^{\pi} e^{ijx} \bar{e}^{-ikx} dx = \int_{-\pi}^{\pi} e^{i(j-k)x} dx$$

$$= \frac{1}{i(j-k)} \left[e^{i(j-k)x} \right]_{-\pi}^{\pi}$$

$$= \begin{cases} 0 & \text{if } j \neq k \\ 2\pi & \text{if } j = k \end{cases}$$

$$f(x) = \frac{1}{2\pi} \sum_{k=-\infty}^{\infty} \underbrace{\langle f(x), \psi_k \rangle}_{c_k} \underbrace{\psi_k}_{e^{ikx}}$$

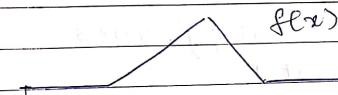


Fourier Series [Matlab]

$$f(x) = \sum a_k \cos\left(k \frac{2\pi x}{L}\right) + b_k \sin\left(k \frac{2\pi x}{L}\right)$$

$$a_k = \langle f(x), \cos\left(k \frac{2\pi x}{L}\right) \rangle$$

$$b_k = \langle f(x), \sin\left(k \frac{2\pi x}{L}\right) \rangle$$



Date: 25-05-2020

Name: Rajeshwari
Gadagi

Course: Python programming

USN: 4AL17EC076

Topic: Fixing programming
errors, Application 3: build a
website blocker

Semester &
Section: 6th sem
'B' section

AFTERNOON SESSION DETAILS

Fixing Programming Errors:-

Syntax Error:-
print ()
print (a)
print a
print (a)
print (a)
print (a)
print (a)
print (a)
print (a)

o/p → file "errors.py", lines

print

Invalid Syntax

- print is a function in python, therefore the print should be enclosed in bracket & even print

Exceptions:-

a = 1

b = "2"

print (a + b)

we get error at print (a + b) but we get error due to previous line i.e., print (b + 2.5)
here we are missing the print closing bracket

Application 3: Build a website Blocker.

Program Architecture

Windows : C:\Windows\System32\drivers\etc

(host file)

Setting up the infinite loop

while True:-

```
if dt(dt.now().year, dt.now().month, dt.now().day) < dt.now() < dt.now().year, dt.now().month, dt.now().day.16:  
    print ("Working hours...")  
else:  
    print ("Fun hours...")  
time.sleep(5)
```

