Daily Assessment format

Date: 25/05/2020

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Course: DSP

Topic: introduction to fourier series & fourier transform, fourier series part 1, fourier series part-2, inner product in Hilbert transform, complex fourier series using matlab, fourier series using python, fourier series & gibbs phenamena using matlab.

Github repository: jyothi-courses

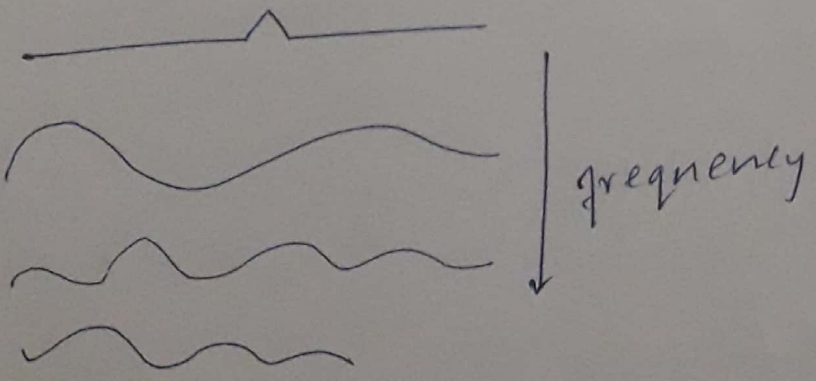
Report

fourier transform (and wavelets)
co-ordinate transform

$u(x, y, t)$

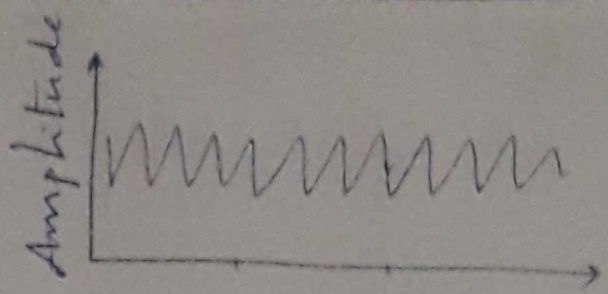
$u_t = \alpha \nabla^2 u$

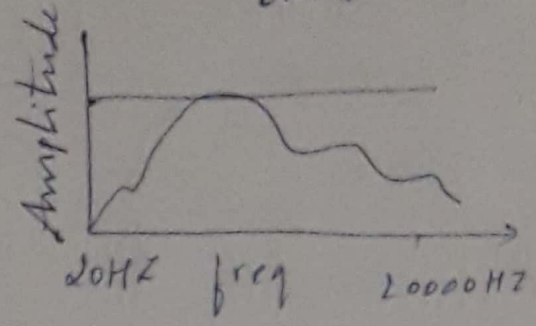
SVD = data driven FFT (fast fourier transform)



- fourier series

$$f(t) = \frac{1}{2} a_0 + \sum_{k=1}^{\infty} (a_k \cos 2\pi k t + b_k \sin 2\pi k t)$$

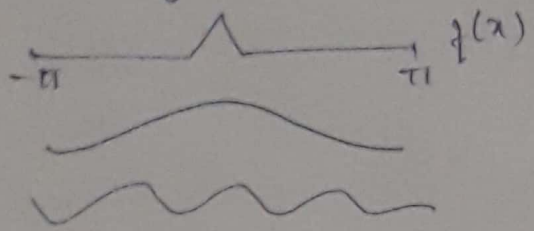




20-20,000Hz i.e range of frequency

fourier series part 1

$$\langle f(x), g(x) \rangle = \int_0^b f(x) g(x)\, dx$$



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

$$A_k = \frac{1}{\pi} \int_{-\pi}^{\pi} f(x) \cos(kx)\, dx \cdot \frac{1}{|\cos(kx)|^2} \langle kx \rangle \frac{1}{\cos(kx)}$$

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

$$= \frac{1}{|\sin(kx)|^2} \langle f(x), \sin(kx) \rangle$$

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

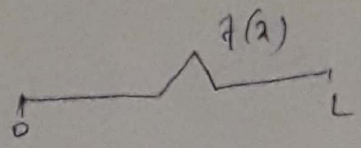
fourier series part 2

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

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

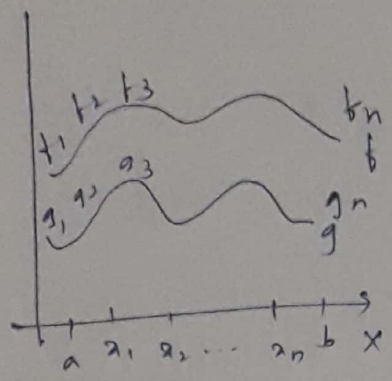
$$A_x = \frac{2}{L}\int_0^L f(x)\cos\left(\frac{2\pi k x}{L}\right)dx$$

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



inner product in hilbert transform

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



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

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

$$f = \boxed{g}\,\boxed{f}$$

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

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

Complex fourier series

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

$$f(x) = \sum_{k=-\infty}^{\infty} c_k e^{jkx}$$

$c_k = \bar{c}_k$ if $f(x)$ is real

$$e^{jkx} = \cos(kx) + j\sin(kx) = \psi_k$$

$$\langle \psi_j, \psi_k\rangle = \int_{-\pi}^{\pi} e^{ijx} e^{-ikx}\,dx$$

$$= \int_{-\pi}^{\pi} e^{i(j-k)x}\,dx$$

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

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

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

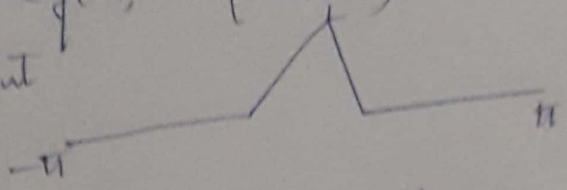
fourier series using matlab (use octave to calculate the code)

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

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

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

output



fourier series using python
fourier series and gibbs phenamena using matlab

Date: 25/05/2020
Course: python
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Topic: fixing programming errors & Application 3: Build website blocker.

Ex:

```
import time
from datetime: import datetime as dt
hosts_path=r"c:\windows\system32\drivers\etc\hosts"
redirect="127.0.0.1"
website_list=["www.facebook.com","www.dubling.mail.live
        .com"]
final_list=[redirect+" "+i for i in website_list]
final_string_block="\n".join(final_list)
while true:
    if dt(dt.now().year,dt.now().month,dt.now().day,8
    <dt.now()<dt(dt.now().year,dt.now().month,
    dt.now().day,18):
    print("within time...")
    with open(hosts_path,"r+") as file:
        content=file.read()
        for website in website_list:
            if website in content:
                pass
            else:
                file.write(redirect+" "+website+"\n")

    else:
        with open(hosts_path,"r+") as file:
            content=file.readlines()
            file.seek(0)
            for line in content:
                if not any(website in line for website in
                        website_list):
                    file.write(line)
            file.truncate()
        time.sleep(2.5)
```

Fixing programming errors
- Syntax errors
- Runtime error
- E
- How to fix difficult errors
- good programming practices
- error handling

Application 3: Build a website blocker
- website blocker how the output will look like
- Application architecture
- setting up the script
- setting up the infinite loop
- implementing the first loop
- implementing the second part.