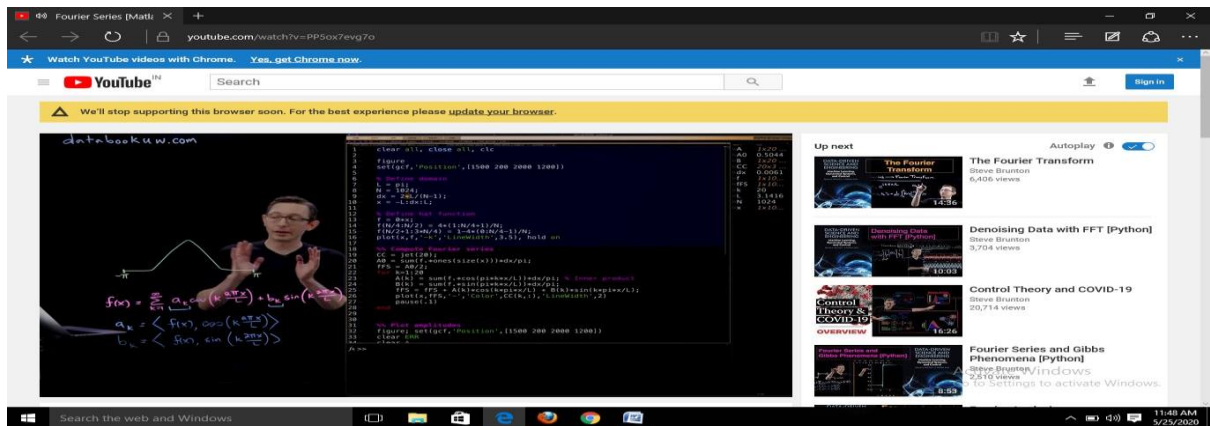
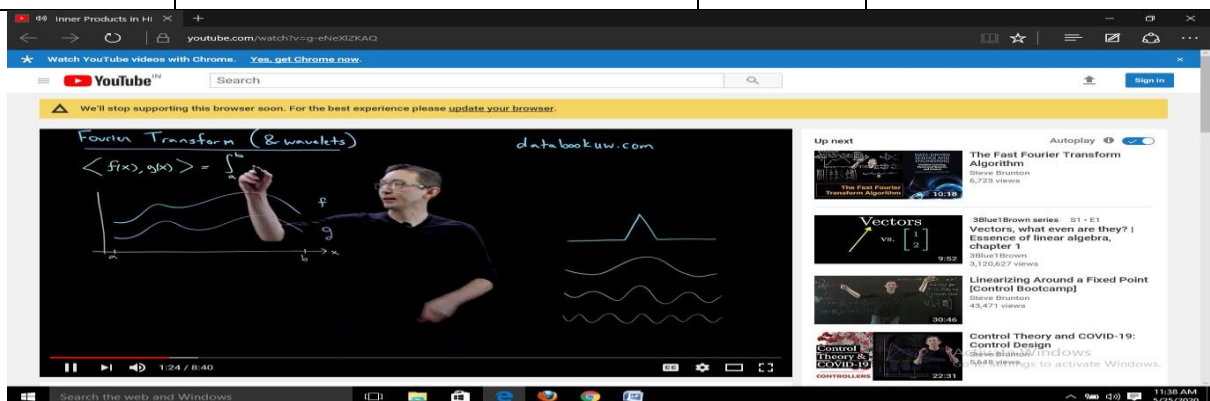


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|--------------------|---|----------------------|---------------------------------|
| Date: | 25-05-2020 | Name: | Poorvi hj |
| Course: | Digitalsignalprocessing | USN: | 4al17ec071 |
| Topic: | Introductiontofourierseries&fourier transform,fourierseriespart-1,fourier seriespart-2,InnerProductinHilbert Transform,complexfourier,fourierseries usingmatlab,fourierseriesusingpython, fourierseries&gibbsphenomenausing matlab. | Semester and section | 6 th sem and 'B' sec |
| Github repository: | Poorvi-2000 | | |



Fourier Series [Pythx] x +

youtube.com/watch?v=dZrSHAgqT44&t=250s

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CH02_SEC01_1_FourierSines

File Edit View Insert Cell Format Help Not Responded [Python3]

```

R = [m[n]]
nqu coast = int(np.floor(N/2))
# Define hat function
f = np.zeros_like(R)
f[nqu coast:Nqu coast+1] = (1/N)*np.arange(1, nqu coast+1)
f[Nqu coast:Nqu coast+1] = np.ones(nqu coast+1) - (1/N)*np.arange(0, nqu coast)
fig, ax = plt.subplots()
ax.plot(R, f, color='b', lw=2)
# Compute Fourier series
sine = np.zeros_like(R)
comp = get_comp(sine, 1)
comp = comp.colors
ax.plot_comp, sines(comp.colors)
A0 = np.sum(f * np.ones_like(R)) + de
fFS = A0/2
A = np.zeros(2)
R = np.zeros(2)
for n in range(1, 20):
    A[n] = np.sum(f * np.cos(np.pi*(n+1)*N/2)) + de # inner product
    R[n] = np.sum(f * np.sin(np.pi*(n+1)*N/2)) + de
fFS = fFS + A[n]*np.cos((n+1)*np.pi*N/2) + R[n]*np.sin((n+1)*np.pi*N/2)
ax.plot(f, fFS, color='r', lw=2)

```

1.0

Up next

Autoplay

Parseval's Theorem
Steve Brunton
2,947 views

Denoising Data with FFT [Python]
Steve Brunton
3,334 views

Control Theory and COVID-19: Sensors
Steve Brunton
1,914 views

Singular Value Decomposition (SVD): Matrix Approximation
Steve Brunton
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Fourier Series and G x +

youtube.com/watch?v=98VixA3MjAC

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Gibbs

File Edit View Insert Cell Format Help Not Responded [Python3]

```

# Gibbs phenomenon
N = 100
nqu coast = int(np.floor(N/2))
# Define hat function
f = np.zeros_like(R)
f[nqu coast:Nqu coast+1] = (1/N)*np.arange(1, nqu coast+1)
f[Nqu coast:Nqu coast+1] = np.ones(nqu coast+1) - (1/N)*np.arange(0, nqu coast)
fig, ax = plt.subplots()
ax.plot(R, f, color='b', lw=2)
# Compute Fourier series
sine = np.zeros_like(R)
comp = get_comp(sine, 1)
comp = comp.colors
ax.plot_comp, sines(comp.colors)
A0 = np.sum(f * np.ones_like(R)) + de
fFS = A0/2
A = np.zeros(2)
R = np.zeros(2)
for n in range(1, 20):
    A[n] = np.sum(f * np.cos(np.pi*(n+1)*N/2)) + de # inner product
    R[n] = np.sum(f * np.sin(np.pi*(n+1)*N/2)) + de
fFS = fFS + A[n]*np.cos((n+1)*np.pi*N/2) + R[n]*np.sin((n+1)*np.pi*N/2)
ax.plot(f, fFS, color='r', lw=2)

```

Up next

Autoplay

Fourier Series and Gibbs Phenomena [Python]
Steve Brunton
3,315 views

Singular Value Decomposition (SVD): Mathematical Overview
Steve Brunton
17,464 views

The Fast Fourier Transform Algorithm
Steve Brunton
6,729 views

Computing the DFT Matrix
Steve Brunton
3,018 views

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25/05/2020

Digital signal programming

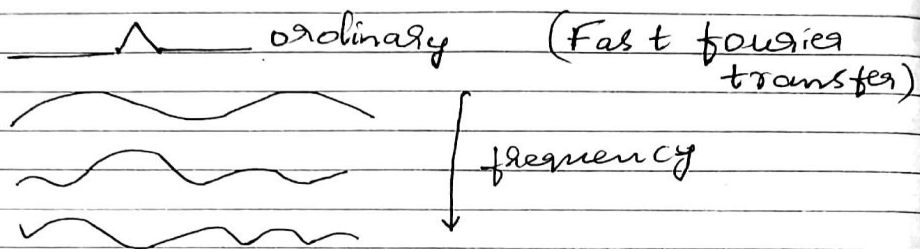
Day-1

- Fourier transform (and wavelets)
- coordinate transform

$$u(x, y, z)$$

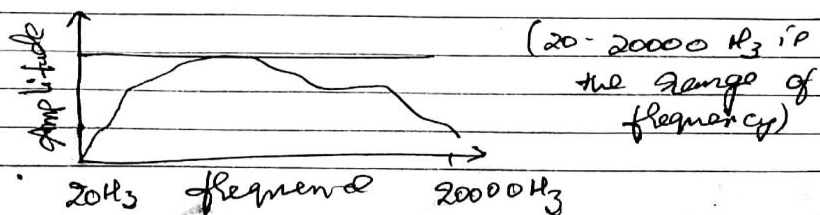
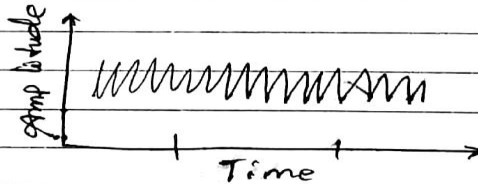
$$u_t = \alpha \cdot \nabla^2 u$$

SVD = data-driven FFT



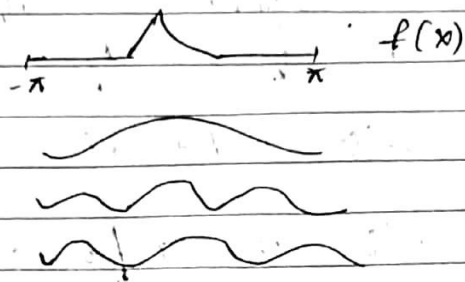
Fourier series

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



Fourier Series part-1

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



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

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

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

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

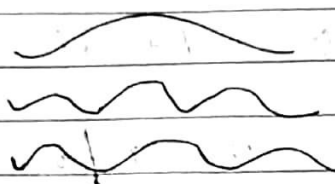
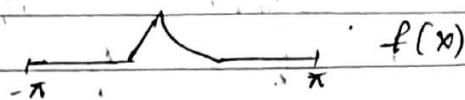
Fourier Series Part-2

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

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

Fourier Series part-1

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



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

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

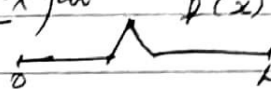
$$B_k = \frac{1}{\pi} \int_{-\pi}^{\pi} f(x) \sin(kx) dx$$
$$= \frac{1}{|\sin(kx)|^2} \langle f(x), \sin(kx) \rangle$$

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

Fourier Series Part-2

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

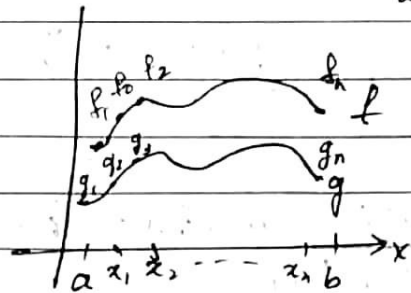
$$f(x) = \frac{A_0}{2} + \sum_{k=1}^{\infty} \left(A_k \cos\left(\frac{2\pi kx}{L}\right) + B_k \sin\left(\frac{2\pi kx}{L}\right) \right)$$

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


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

Inner product in Hilbert Transform

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



$$f = \begin{bmatrix} f_1 \\ f_2 \\ \vdots \\ f_n \end{bmatrix}$$

$$g = \begin{bmatrix} g_1 \\ g_2 \\ \vdots \\ g_n \end{bmatrix}$$

$$\langle f, g \rangle = g^T f = \begin{bmatrix} g_1 & g_2 & \dots & g_n \end{bmatrix} \begin{bmatrix} f_1 \\ f_2 \\ \vdots \\ f_n \end{bmatrix}$$

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

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

Complex Fourier Series

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

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

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

$$e^{ikx} = \cos(kx) + i \sin(kx) = \psi_k$$

$$\begin{aligned}
 \langle \psi_j, \psi_k \rangle &= \int_{-\pi}^{\pi} e^{ijx} e^{-jkx} dx \\
 &= \int_{-\pi}^{\pi} e^{i(j-k)x} dx \\
 &= \frac{1}{i(j-k)} \left[e^{i(j-k)x} \right]_{-\pi}^{\pi} \\
 &= \begin{cases} 0 & \text{if } j \neq k \\ 2\pi & \text{if } j = k \end{cases} \\
 &= \frac{1}{2\pi} \sum_{k=-\infty}^{\infty} \underbrace{\langle f(x), \psi_k \rangle}_{c_k} \underbrace{\psi_k}_{\frac{e^{ikx}}{e^{ikx}}}
 \end{aligned}$$

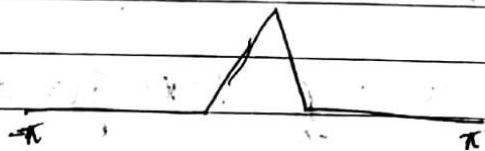
Fourier Series using matlab (use octave to execute the code)

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

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

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

output :



* Fourier Series using Python

* Fourier Series and Gibbs phenomenon using matlab

| | | | |
|---------|---|-----------------------------|-------------------------------|
| Date: | 25-05-2020 | Name: | Poorvi hj |
| Course: | Pythonprogramming | USN: | 4al17ec071 |
| Topic: | Fixingprogrammingerrors &Application3:Buildawebsite blocker | Semester and section: | 6 th semand'B'sect |

142. Syntax Errors

```

errors.py
1 print(1)
2 int(9)
3 int(999)
4 print(2)
5 a = [1,2,3]
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```


video, here is another example:

```
1 >>> lines = ["trees are good", "pool is fresh", "face is round"]
2 >>> website_list = ["face", "clock", "trend"]
3 >>> for line in lines:
4 ...     any(website in line for website in website_list)
5 ...
6 False
7 False
8 True
```

We start iterating over the items of `website_list` using a `for` loop. In the first iteration we would have:

```
any(website in "trees are good" for website in
website_list)
```

Inside the parenthesis of `any()` there's another loop that iterates over `website_list`:

```
1 ("face" in "trees are good")
2 ("clock" in "trees are good")
3 ("trend" in "trees are good")
```

If `any` of the above is `True` you get the expression evaluated to `True`. In this case none of them is `True`, so you get `False`.

If you want to return `True` (if all of them are `True`), use `all()` instead of `any()`.

So, the part `any(website in line for website in website_list)` will either be equal to `True` or `False`.

Activate Windows
Go to Settings to activate Windows.



25/05/2020

Day - 6

Fixing programming errors and
Application 3: Build a website
Blocker

Fixing programming errors

* Syntax errors

* Runtime errors

* E.

* How to fix difficult errors

* Good programming questions

* 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

