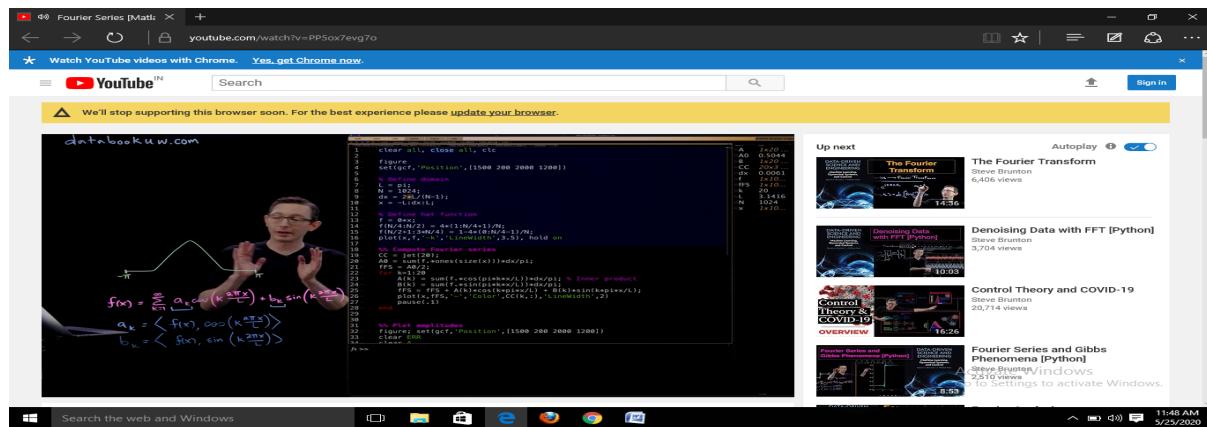
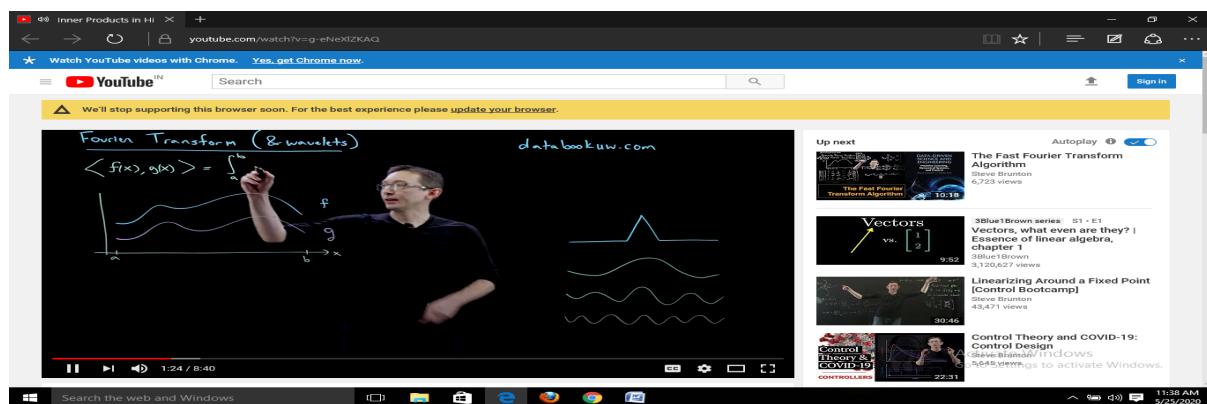
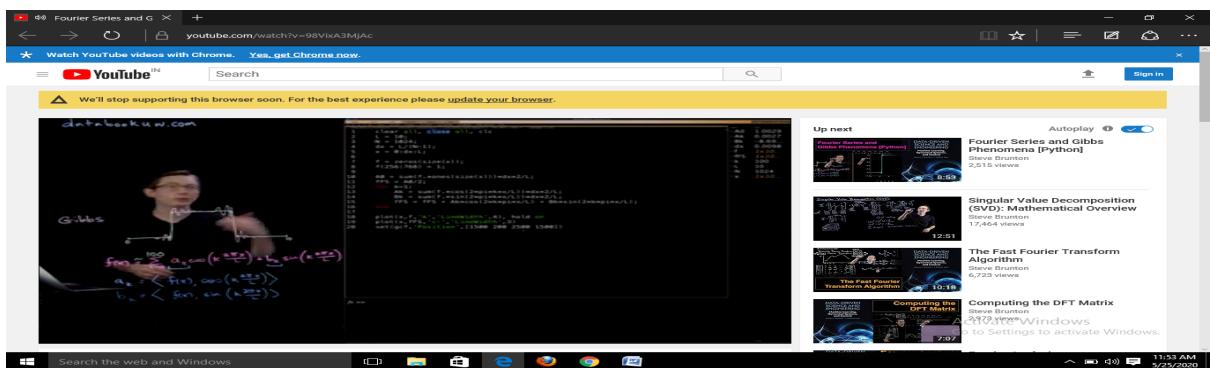
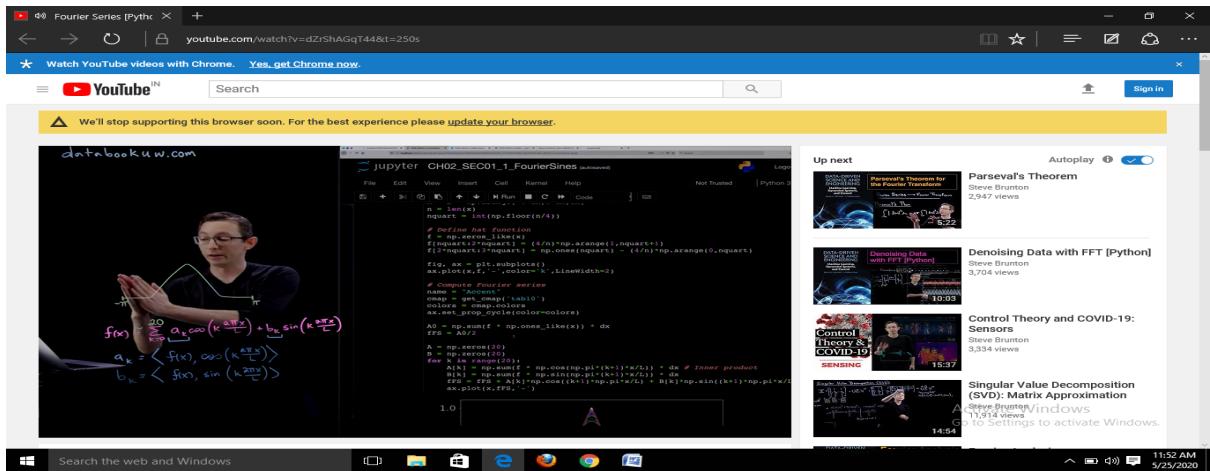


Date:	25-05-2020	Name:	Roshni A B
Course:	Digital signal processing	USN:	4AL17EC080
Topic:	Introduction to fourier series & fourier transform, fourier series part-1, fourier series part-2, Inner Product in Hilbert Transform, complex fourier, fourier series using matlab, fourier series using python, fourier series & gibbs phenomena using matlab.	Semester and section	6 th sem and 'B' sec
Github repository:	roshni-online		





25/05/2020

Digital signal programming

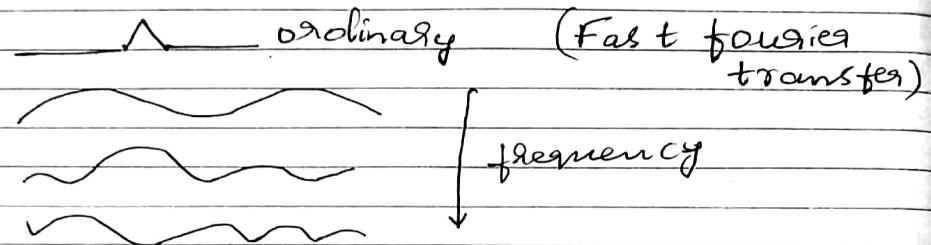
Day-1

- Fourier transfer (and Wavelets)
- coordinate transform

$$[u(x,y)]$$

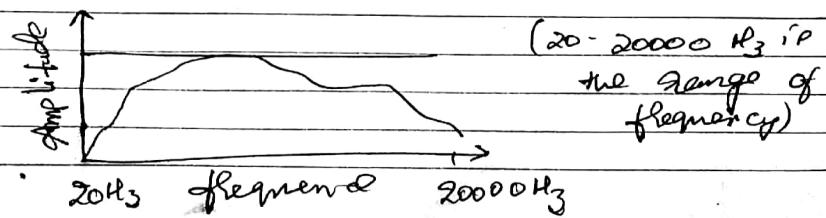
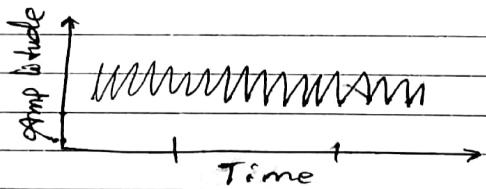
$$u_t = \alpha \cdot \nabla^2 u$$

SVD = data - driven FFT



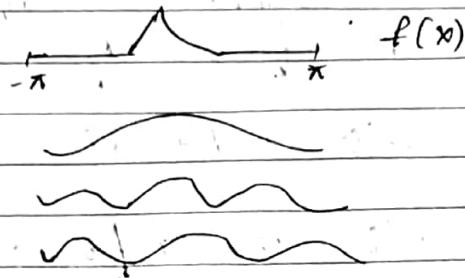
Fourier Series

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



Fourier Series: Part - 1

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



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

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

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

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

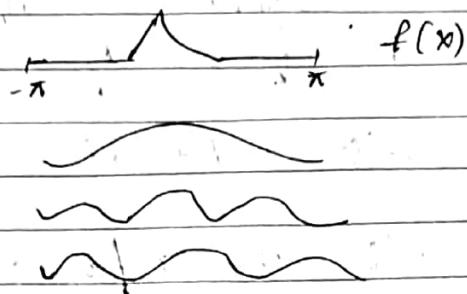
Fourier Series: Part - 2

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

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

Fourier Series Part-1

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



$$f(x) = \frac{A_0}{2} + \sum_{k=1}^{\infty} (A_{k0} \cos(kx) + B_{k0} \sin(kx))$$

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

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

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

Fourier Series Part-2

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

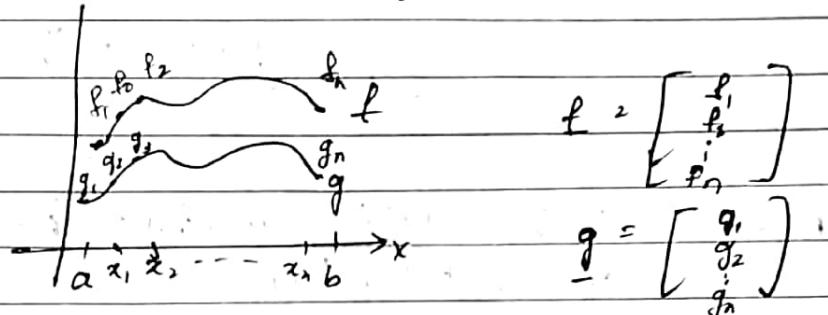
$$f(x) = \frac{A_0}{2} + \sum_{k=1}^{\infty} (A_k \cos\left(\frac{2\pi k x}{L}\right) + B_k \sin\left(\frac{2\pi k x}{L}\right))$$

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

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

Inner product in Hilbert Transform

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



$$\langle f, g \rangle = \underline{g^T} \underline{f} = \sum_{k=1}^n f_k \bar{g}_k$$

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

Complex Fourier Series

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

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

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

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

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

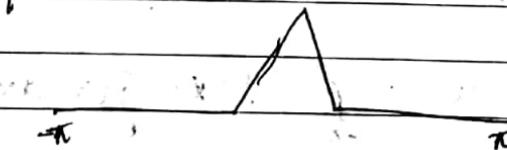
Fourier Series using matlab (use octave to execute the code)

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

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

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

output :



• Fourier Series using python

• Fourier Series and Gibbs phenomena using matlab

Date:	25-05-2020	Name:	Roshni A B
Course:	Python programming	USN:	4AL17EC080
Topic:	Fixing programming errors & Application 3: Build a website blocker	Semester and section:	6 th sem and 'B' sect

```

142. Syntax Errors
errors.py
errors.py
errors.py -- ~/Dropbox/pm1/other/NewVideos
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 error

* 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 for script

* Setting up the infinite loop

* Implementing the first loop

* Implementing the second part

