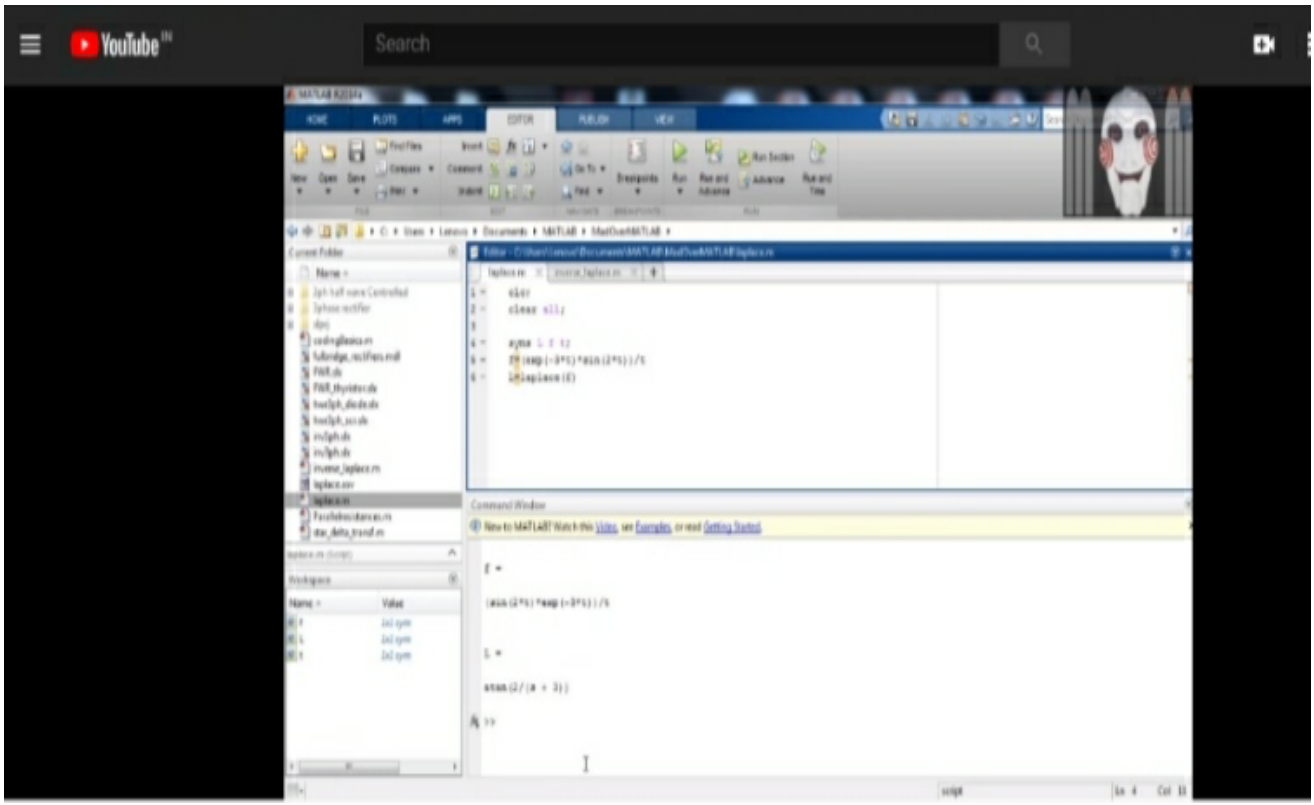
DAILY ASSESSMENT REPORT

Date:	26/05/2020	Name:	Abhishek
Subject:	Digital Signal Processing	USN:	4AL17EC001
Topic:	1] Fourier Series & Gibbs Phenomena using Python 2] Fourier Transform 3] Fourier Transform Derivatives 4] Fourier Transform and Convolution 5] Intuition of Fourier Transform and Laplace Transform 6] Laplace Transform of First order 7] Implementation of Laplace Transform using Matlab 8] Applications of Z-Transform 9] Find the Z-Transform of sequence using Matlab	Semester & Section:	6th 'A'
Github Repository:	Abhishek-online-courses		

FORENOON SESSION DETAILS
Image of session



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Derivatives of functions

The Fourier transform of the derivative of a function is given by:

$$\begin{aligned}\mathcal{F}\left(\frac{d}{dx}f(x)\right) &= \int_{-\infty}^{\infty} \overbrace{f'(x)}^{dv}\overbrace{e^{-i\omega x}}^{u}\,dx \\ &= \Big[\underbrace{f(x)e^{-i\omega x}}_{uv}\Big]_{-\infty}^{\infty} - \int_{-\infty}^{\infty} \underbrace{f(x)}_{v}\Big[\underbrace{-i\omega e^{-i\omega x}}_{du}\Big]\,dx \\ &= i\omega\int_{-\infty}^{\infty} f(x)e^{-i\omega x}\,dx \\ &= i\omega\mathcal{F}(f(x)).\end{aligned}$$

- This is an extremely important property of the Fourier transform, as it will allow us to turn PDEs into ODEs, closely related to the separation of variables:

$$\underset{\text{(PDE)}}{u_{tt} = cu_{xx}} \quad \overset{\mathcal{F}}{\Longrightarrow} \quad \underset{\text{(ODE)}}{\hat{u}_{tt} = -c\omega^2\hat{u}.}$$

Linearity of Fourier transforms

The Fourier transform is a linear operator, so that:

$$\mathcal{F}(\alpha f(x) + \beta g(x)) = \alpha\mathcal{F}(f) + \beta\mathcal{F}(g).$$

$$\mathcal{F}^{-1}(\alpha\hat{f}(\omega) + \beta\hat{g}(\omega)) = \alpha\mathcal{F}^{-1}(\hat{f}) + \beta\mathcal{F}^{-1}(\hat{g}).$$

Parseval's theorem

$$\int_{-\infty}^{\infty} |\hat{f}(\omega)|^2 \, d\omega = 2\pi \int_{-\infty}^{\infty} |f(x)|^2 \, dx.$$

Convolution

The convolution of two functions is particularly well-behaved in the Fourier domain, being the product of the two Fourier transformed functions. Define the convolution of two functions f(x) and g(x) as f * g:

$$(f * g)(x) = \int_{-\infty}^{\infty} f(x - \xi) g(\xi) \, d\xi.$$

If we let ^f = F(f) and ^g = F(g), then:

$$\begin{aligned}
\mathcal{F}^{-1}\left(\hat{f}\hat{g}\right)(x) &= \frac{1}{2\pi} \int_{-\infty}^{\infty} \hat{f}(\omega)\hat{g}(\omega) e^{i\omega x} \, d\omega \\
&= \int_{-\infty}^{\infty} \hat{f}(\omega) e^{i\omega x} \left(\frac{1}{2\pi} \int_{-\infty}^{\infty} g(y) e^{-i\omega y} \, dy \right) d\omega \\
&= \frac{1}{2\pi} \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} g(y) \hat{f}(\omega) e^{i\omega(x-y)} \, d\omega \, dy \\
&= \int_{-\infty}^{\infty} g(y) \Bigg(\underbrace{\frac{1}{2\pi} \int_{-\infty}^{\infty} \hat{f}(\omega) e^{i\omega(x-y)} \, d\omega}_{f(x-y)} \Bigg) dy \\
&= \int_{-\infty}^{\infty} g(y) f(x - y) \, dy = g * f = f * g.
\end{aligned}$$

Laplace Transform

Laplace transform of a signal (function) f is the function F = L(f) defined by:

$$F(s) = \int_0^\infty f(t)e^{-st}\,dt$$

For those s ∈ C for which the integral makes sense.

- F is a complex-valued function of complex numbers.
- s is called the (complex) frequency variable, with units sec^{-1}.
- t is called the time variable (in sec).
- Assume f contains no impulses at t = 0.

Date:	**26/05/2020**	**Name:**	**Abhishek**
Course:	**The Python Mega Course: Build 10 Real World Applications**	**USN:**	**4AL17EC001**
Topic:	**Application 3: Build a Website Blocker**	**Semester & Section:**	**6th 'A'**
Gitub Repository:	**Abhishek-online-ourses**		

AFTERNOON SESSION DETAILS
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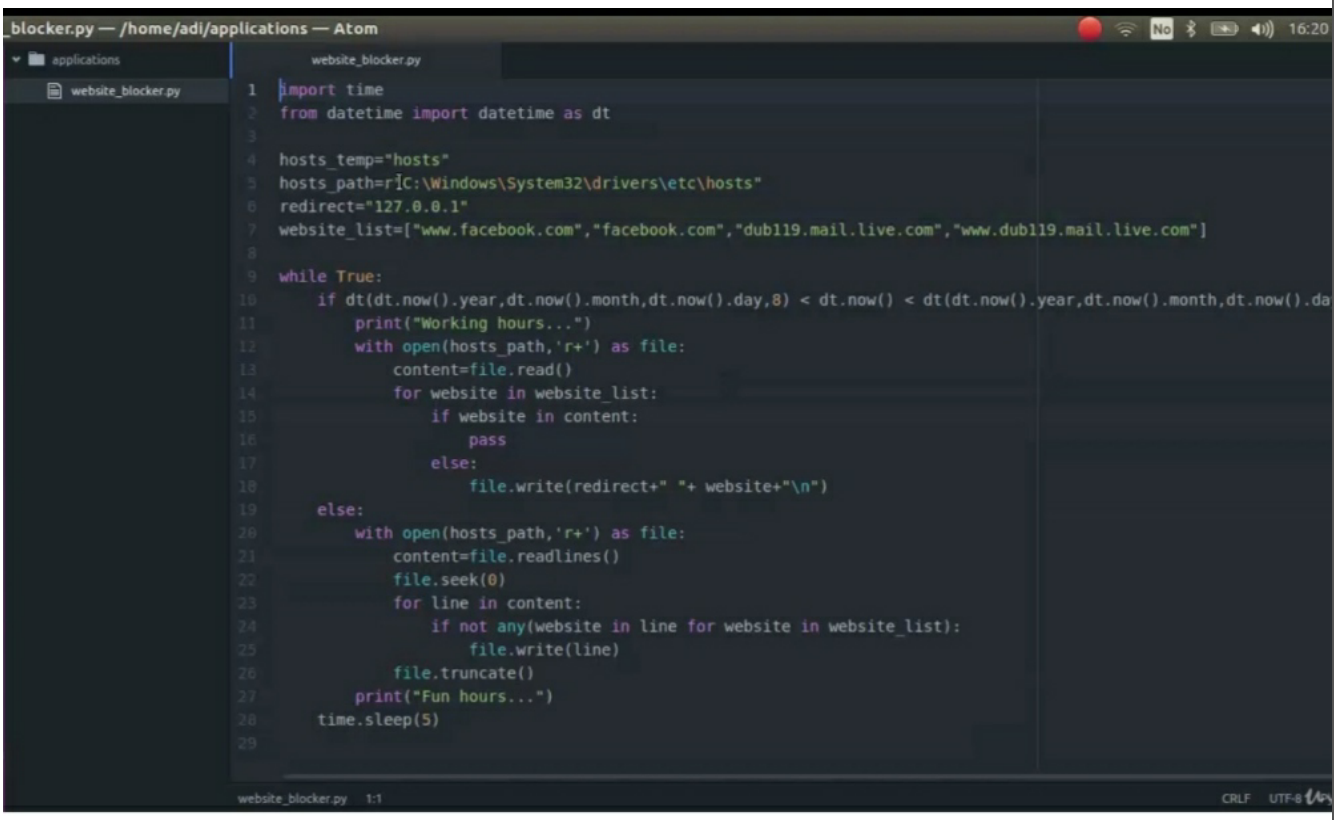

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Application 3: Build a Website Blocker

- The computer file ‘hosts’ is an operating system file that maps hostnames to IP addresses. It is a plain text file.
- In Windows 7/8/10, your hosts file is located at: C:\Windows\System32\drivers\etc\hosts.
- Current date and time can be obtained from datetime.now () function which is present under time module.
- Lists of websites to be blocked should be stored in a variable in a list format.
- To read the host file file.read () function is used and stored in a variable.
- To perform write operation on host file file.write () function is used.
- The term ‘r+’ mode allows to perform read and write operation on file.
- Sleep (x) function under time module is used to check condition for every ‘x’ interval.
- To delete the website list in host file after the working hours complete, can be done using file.readlines (), file.seek (0) and file.truncate () functions.
- Python any () function accepts iterable (list, tuple, dictionary etc.) as an argument and return true if any of the element in iterable is true, else it returns false. If iterable is empty then any () method returns false.
- To run python file in the background it must be saved in file.pyw format and also should be executed as an administrator (High priority).
- With the help of Task scheduler, the program can be successfully executed in the background.