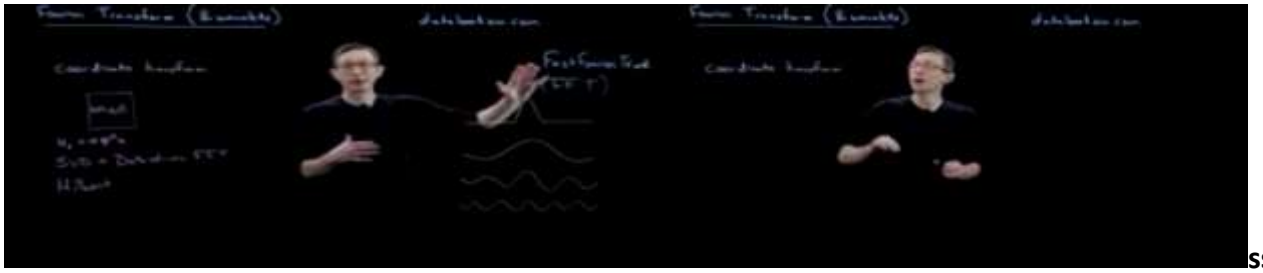
DAILY ASSESSMENT FORMAT

Date:	**25-05-2020**	**Name:**	**PRINCIA MELITA DSOUZA**
Course:	**DIGITAL SIGNAL PROCESSING**	**USN:**	**4AL17EC075**
Topic:	**INTRODUCTION TO FOURIER SERIES AND FOURIER TRANSFORM**	**Semester & Section:**	**6TH B**
Github Repository:	**MELITA-1999**		

FORENOON SESSION DETAILS

Image of session



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Discrete Fourier transform converts a finite sequence of equally-spaced samples of a function into a same-length sequence of equally-spaced samples of the discrete-time Fourier transform , which is a complex-valued function of frequency. The interval at which the DTFT is sampled is the reciprocal of the duration of the input sequence. An inverse DFT is a Fourier series, using the DTFT samples as coefficients of complex sinusoids at the corresponding DTFT frequencies. It has the same sample-values as the original input sequence. The DFT is therefore said to be a frequency domain representation of the original input sequence. If the original sequence spans all the non-zero values of

a function, its DTFT is continuous, and the DFT provides discrete samples of one cycle. If the original sequence is one cycle of a periodic function, the DFT provides all the non-zero values of one DTFT cycle.
The DFT is the most important discrete transform, used to perform Fourier analysis in many practical applications. In digital signal processing, the function is any quantity or signal that varies over time, such as the pressure of a sound wave, a radio signal, or daily temperature readings, sampled over a finite time interval. In image processing, the samples can be the values of pixels along a row or column of a raster image. The DFT is also used to efficiently solve partial differential equations, and to perform other operations such as convolutions or multiplying large integers.
Since it deals with a finite amount of data, it can be implemented in computers by numerical algorithms or even dedicated hardware. These implementations usually employ efficient fast Fourier transform algorithms so much so that the terms "FFT" and "DFT" are often used interchangeably. Prior to its current usage, the "FFT" initialize may have also been used for the ambiguous term "finite Fourier transform".

Fourier analysis is a method of defining periodic waveform s in terms of trigonometric function s. The method gets its name from a French mathematician and physicist named Jean Baptiste Joseph, Baron de Fourier, who lived during the 18th and 19th centuries. Fourier analysis is used in electronics, acoustics, and communications.
Many waveforms consist of energy at a fundamental frequency and also at harmonic frequencies (multiples of the fundamental). The relative proportions of energy in the fundamental and the harmonics determines the shape of the wave. The wave function (usually amplitude , frequency, or phase versus time) can be expressed as of a sum of sine and cosine function s called a Fourier series , uniquely defined by constants known as Fourier coefficients.

If these coefficients are represented by a , a 1 , a 2 , a 3 , ..., a n , ... and b 1 , b 2 , b 3 , ..., b n , ..., then the Fourier series F (x), where x is an independent variable (usually time), has the following form:
F (x) = a /2 + a 1 cos x + b 1 sin x + a 2 cos 2 x + b 2 sin 2 x + ... + a n cos nx + b n sin nx + ...

Fourier analysis is the study of the way general functions may be represented or approximated by sums of simpler trigonometric functions. Fourier analysis grew from the study of Fourier series, and is named after Joseph Fourier, who showed that representing a function as a sum of trigonometric functions greatly simplifies the study of heat transfer.
Fourier analysis encompasses a vast spectrum of mathematics. In the sciences and engineering, the process of decomposing a function into oscillatory components is often called Fourier analysis, while the operation of rebuilding the function from these pieces is known as Fourier synthesis. For example, determining what component frequencies are present in a musical note would involve computing the Fourier transform of a sampled musical note. One could then re-synthesize the same sound by including the frequency components as revealed in the Fourier analysis. In mathematics, the term Fourier analysis often refers to the study of both operations.
The decomposition process itself is called a Fourier transformation. Its output, the Fourier transform, is often given a more specific name, which depends on the domain and other properties of the function being transformed. Moreover, the original concept of Fourier analysis has been extended over time to apply to more and more abstract and general situations and the general field is often known as harmonic analysis. Each transform used for analysis has a corresponding inverse transform

that can be used for synthesis.

Applications

Fourier analysis has many scientific applications – in physics, partial differential equations, number theory, combinatory, signal processing, digital image processing, probability theory, statistics, forensics, option pricing, cryptography, numerical analysis, acoustics, oceanography, sonar, optics, diffraction, geometry, protein structure analysis, and other areas.
This wide applicability stems from many useful properties of the transforms:
The transforms are linear operators and, with proper normalization, are unitary as well
The transforms are usually invertible.
The exponential functions are eigenfunctions of differentiation, which means that this representation transforms linear differential equations with constant coefficients into ordinary algebraic ones. Therefore, the behavior of a linear time-invariant system can be analyzed at each frequency independently.By the convolution theorem, Fourier transforms turn the complicated convolution operation into simple multiplication, which means that they provide an efficient way to compute convolution-based operations such as polynomial multiplication and multiplying large numbers.
The discrete version of the Fourier transform can be evaluated quickly on computers using Fast Fourier Transform algorithms.
In forensics, laboratory infrared spectrophotometers use Fourier transform analysis for measuring the wavelengths of light at which a material will absorb in the infrared spectrum. The FT method is used to decode the measured signals and record the wavelength data. And by using a computer, these Fourier calculations are rapidly carried out, so that in a matter of seconds, a computer-operated FT-IR instrument can produce an infrared absorption pattern comparable to that of a prism instrument.

Fourier transformation is also useful as a compact representation of a signal. For example, JEPG compression uses a variant of the Fourier transformation of small square pieces of a digital image. The Fourier components of each square are rounded to lower arithmetic precision, and weak components are eliminated entirely, so that the remaining components can be stored very compactly. In image reconstruction, each image square is reassembled from the preserved approximate Fourier-transformed components, which are then inverse-transformed to produce an approximation of the original image.

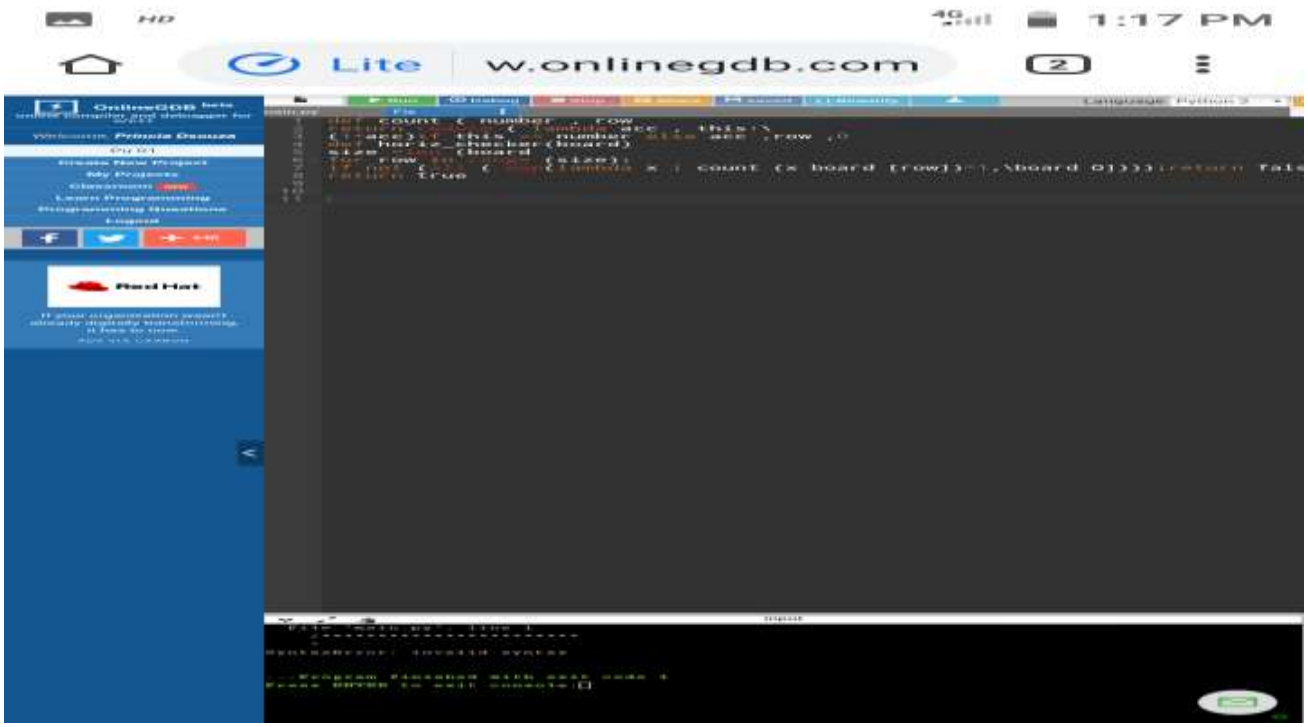
Applications in signal processing
When processing signals, such as audio, radio waves, light waves, seismic waves, and even images, Fourier analysis can isolate narrowband components of a compound waveform, concentrating them for easier detection or removal. A large family of signal processing techniques consist of Fourier-transforming a signal, manipulating the Fourier-transformed data in a simple way, and reversing the transformation.

Summary
For periodic functions, both the Fourier transform and the DTFT comprise only a discrete set of frequency components, and the transforms diverge at those frequencies. One common practice is to handle that divergence via Dirac delta and Dirac comb functions. But the same spectral information can be discerned from just one cycle of the periodic function, since all the other cycles are identical. Similarly, finite-duration functions can be represented as a Fourier series, with no actual loss of information except that the periodicity of the inverse transform is a mere artifact.
It is common in practice for the duration of s to be limited to the period, P or N. But these formulas do not require that condition

Date:	**25-05-2020**	**Name:**	**PRINCIA MELITA DSOUZA**
Course:	**PYTHON**	**USN:**	**4AL17EC075**
Topic:	**Fixing programming errors and Build a website blocker**	**Semester & Section:**	**6TH B**

AFTERNOON SESSION DETAILS

Image of session



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Fixing programming errors

The correct way to fix a Python error one of the things that separates them from novices is that they know how to fix an error. Not knowing how to fix an error will not only waste a lot of time, but even worse it can demotivate you to the point where you feel dump and give up learning how to program. In this reading you will learn the secrets of finding and fixing a Python code error.

I like examples, so let's take a look at one.

The Python code below is supposed to create a dictionary and print that dictionary out.

```
data = ("Name":"John", "Surname":"Smith")
print(data)
```

However, when executed, the code produces the following output:

```
File "script2.py", line 1

data = ("Name":"John", "Surname":"Smith")
           ^
Syntax Error: invalid syntax
```

That's the entire error message you got. Now here are the steps on how to understand and solve that error.

Read the error from the beginning.
The first line tells you the location of the error. So, the error happened in script1.py (that was the name of my script), on line 1.
Now you know where the error occurred. For your convenience you also have the line that caused the error printed out in the second line of the error message.
Next, look at the error type.

In this case the error type is a Syntax Error. That means you have written something that doesn't follow the Python syntax rules. So, now you have an idea of what error you are dealing with. For an overview of possible Python error types you can look here.
Look at the details of the error.

On the right of Syntax Error you have the detailed information about the error. In this case this information is "invalid syntax" and you also have an arrow character pointing upward. That error is pointing to the colon character. The arrow is trying to say that the colon doesn't belong there.
Time to use your logic.

the Python interpreter gave you all the information that a robot can give. Now it's your turn as a human to use your logic to fix the error. So, Python executes a script from top to bottom, line by line, and reads each line from left to right.
In this case it started to read the first line and it detected round brackets after the assignment operator. That means you are creating a tuple. That's fine. But then after you write the first item you were supposed to write a comma to separate that item from the next item, but you used a colon

instead, so the interpreter is saying that a colon is not syntactically correct to use with round brackets. Therefore, you should make up your mind to either write a tuple like data = ("Name", "John", "Surname", "Smith")or a dictionary of key-value pairs like data = {"Name":"John", "Surname":"Smith". The decision is up to you. In this case though I believe the programmer meant to write a dictionary, so I am going to replace the round brackets with curly brackets because I know a dictionary is defined through curly brackets.

That's the formula to fix an error. Sometimes though errors are much more complex than this, so in that case copying and pasting the last line of the error (Syntax Error: invalid syntax in this case) on Google will usually show up forums posts with answers on fixing that particular error. However, that should be the last resort as it's better to use your knowledge first.

Website Blocker Using Python

This is real world program which blocks certain distracting website like Facebook, Youtube etc. during your work hours.

About the program : in this program is that we will pass the link of websites which you think is distracting and the time that you are working on your computer and program will block those website.
Every system have host file whether it is Mac, Windows or Linux.
Host file in Mac and Linux :
/etc/hosts
Host file in Windows:

Working of host file: Host is an operating system file which maps hostnames to IP addresses. In this program we will be mapping hostnames of websites to our localhost address. Using python file handling manipulation we will write the hostname in hosts.txt and remove the lines after your working hours.
Host file in Mac:

```
import time
from datetime import datetime as dt
hosts_path = "/etc/hosts"
# localhost's IP
redirect = "127.0.0.1"
# websites That you want to block
while True:
 # time of your work
 if dt(dt.now().year, dt.now().month, dt.now().day,8)
 < dt.now() < dt(dt.now().year, dt.now().month, dt.now().day,16):
 print("Working hours...")
with open(hosts_path, 'r+') as file:
 content = file.read()
 for website in website_list:
 if website in content:
 pass
 else:
# mapping hostnames to your localhost IP address
 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)
# removing hostnmes from host file
 file.truncate()
 print("Fun hours...")
time.sleep(5)
```