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| Activity No. 8 | |
| Fundamental Fourier Transform in Python | |
| **Course Code:** CPE 027 | **Program:** BS CpE |
| **Course Title:** Digital Signal Processing and Applications | **Date Performed:** 11/14/2023 |
| **Section:** CPE 41S1 | **Date Submitted:** |
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| **1. Objective:** | |
| This activity aims to introduce the Fourier transform process by demonstrating with the programmatic processing of both arbitrarily generated signals and collected data. | |
| **2. Intended Learning Outcomes (ILOs):** | |
| After completion of this activity the students should be able to:  Develop a program capable of frequency domain convolution using DFT. | |
| **3. Discussion :** | |
| 1. What is the fourier transform? What is its history? 2. Why is the principle of fourier transform valued in industry? 3. How is fourier transform and its principles applied in real life signal processing? | |
| **4. Resources:** | |
| The activity will require the following software, tools and equipment: | |
| **5. Directions:** | |
| **Part 1: Basic FFT**  1. Write a code using matplotlib, scipy, and numpy to perform the activity.  2. Create a composite signal consisting of three (3) different sinewaves of varying frequencies and amplitude. Plot the signal using matplotlib.  3. Use the scipy method to capture the fourier transform of a the generated composite waveform. Plot the generated array.  4. Take note of the results and document your work.  **Part 2: Noise Introduction**   1. Add noise to the composite signal and repeat the procedure performed in the first part of this activity. 2. Take note of the results and document your work.   **Part 3: Applied FFT**  4. Refer to Activity 1, Modify the code you used in Activity 1. Use the fast fourier transform to visualize each step in the provided dataset.  5. Determine points of interest in the data based on the resulting plots.  5. Analyze and Compare the results of procedure 4 to the histogram results of activity 1. | |
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| *\*Document EVERYTHING you did to accomplish this. Discuss why you did those.* | |
| **7. Results(sample)** | |
| *\*Don’t forget to add a link of your ipynb file, csv, and image results.* | |
| **8. Data Analysis** | |
| ***\*****what did you observe in the data?* | |
| **9. Summary and Conclusions** | |
| *\*summarize what you did. What did you find out?* | |
| **10. Learnings and Contributions of each member** | |
| *\*what did you do to contribute to this activity? What new learnings, methods and techniques did you pick up? Describe in detail.* | |