

# **Report on Innovative Teaching Practices: Flipped Classroom for Principles of Medical Image Processing**

**Academic Year:** 2023 – 2024

**Semester/Branch:** S7 BME

**Subject:** BMT401 – Principles of Medical Image Processing

**Faculty:** Ms. Sharon Gomez

**Innovative Teaching Method:** Flipped classroom

**Topic/Question:** Image Enhancement in the Spatial Domain

## **Introduction**

This report aims to highlight the implementation of innovative teaching practices in the "Principles of Medical Image Processing" course, with a particular focus on employing a flipped classroom approach for the topic "Image Enhancement in the Spatial Domain". The flipped classroom model is intended to enhance student engagement, deepen understanding, and promote active participation in the learning process.

## **Flipped Classroom Approach**

### **Overview**

For the topic "Image Enhancement in the Spatial Domain," a flipped classroom methodology was utilized to deliver instructional content. This approach inverted traditional teaching methods by having students access pre-recorded lectures, reading materials, and multimedia resources before class sessions. Classroom time was then devoted to discussions, collaborative activities, and practical exercises.

### **Rationale**

The flipped classroom model was chosen for several reasons:

- To promote self-directed learning and student responsibility.
- To utilize class time effectively for interactive and applied learning activities.
- To enhance engagement and understanding of concepts related to medical image processing.

### **Material Sharing**

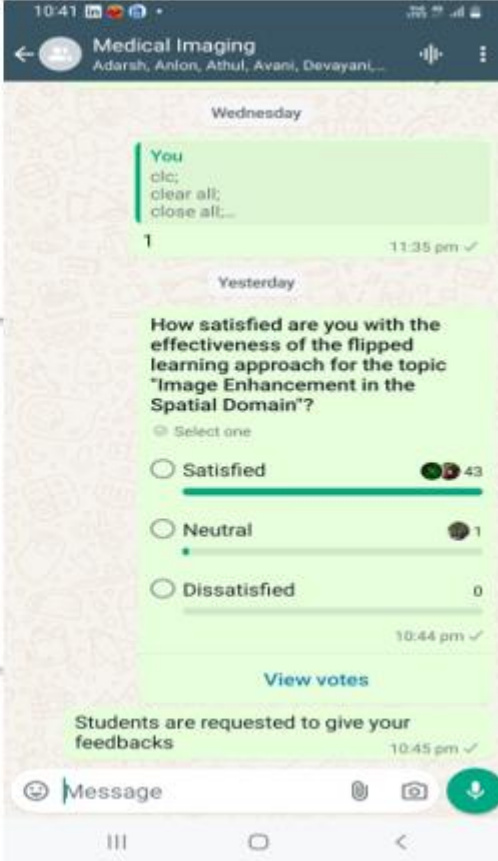

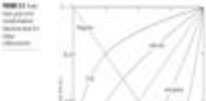

Reading materials and supplementary resources were provided as hard copies to ensure efficient and effective dissemination of content.

## Student feedback

A WhatsApp poll was conducted to gather feedback from students regarding the flipped classroom approach implemented in BMT401 - Principles of Medical Image Processing. The results indicated a generally positive response, highlighting the effectiveness of this innovative teaching method. Most students expressed satisfaction with the pre-class material sharing and interactive in-class discussions. They appreciated the flexibility to review materials at their own pace, allowing for a more personalized learning experience.

## Proof

The material has been distributed in hardcopy during the class, and a screenshot of the WhatsApp poll is provided below.

<h3>Image Enhancement in the Spatial Domain</h3>	<h3>Image Enhancement (Spatial)</h3> <ul style="list-style-type: none"><li>Image enhancement:<ol style="list-style-type: none"><li>Improving the interpretability or perception of information in images for human viewers</li><li>Providing "better" input for other automated image processing techniques</li></ol></li><li>Spatial domain methods: operate directly on pixels</li><li>Frequency domain methods: operate on the Fourier transform of an image</li></ul>	
<h3>Point Processing</h3> <ul style="list-style-type: none"><li>The simplest kind of range transformations are these independent of position <math>x,y</math>:<math display="block">g = T(f)</math></li><li>This is called point processing.</li><li><b>Important:</b> every pixel for himself – spatial information completely lost!</li></ul>	<h3>Obstacle with point processing</h3> <ul style="list-style-type: none"><li>Assume that <math>f</math> is the clown image and <math>T</math> is a random function and apply <math>g = T(f)</math>: </li><li>What we take from this?<ol style="list-style-type: none"><li>May need spatial information</li><li>Need to restrict the class of transformation, e.g. assume monotonicity</li></ol></li></ul>	
<h3>Basic Point Processing</h3> 	<h3>Negative</h3> 	

## Conclusion

The overwhelmingly positive feedback from students on the flipped classroom approach in BMT401 - Principles of Medical Image Processing underscores its effectiveness in fostering engagement and satisfaction. This innovative teaching practice has proven to be a valuable method for enhancing the learning experience in this course.