Human-Centered Computing (HCC)

Place: Room 107, New Building, IIS, AS / Delta Building, NTHU

Time: Wed, 09:00-12:00

Chair: Dr. Jun-Cheng Chen (Chair)
Dr. Chia-Wen Lin
Dr. Wen-Hung Liao
Dr. Yan-Tsung Peng
Dr. Li Su

1. Introduction to Multimedia
   1.1. What is Multimedia?
   1.2. Overview of Multimedia Applications
   1.3. Multimedia Research Resources

2. Multimedia Basics
   2.1. Graphics and Image Data Representations
   2.2. Color in Image and Video
   2.3. Fundamental Concepts in Video
   2.4. Basics of Digital Audio

3. Machine Learning and Deep Learning in Social Multimedia Analytics
   3.1. Machine learning Basics
   3.2. Deep Learning Basics
   3.3. Unsupervised/Semi-supervised/Supervised Learning, etc.

4. Multimedia Processing & Coding
   4.1. Video coding fundamentals
   4.2. Lossless Compression & Lossy Compression
   4.3. Transform Coding
   4.4. Motion Compensated Predictive Coding
   4.5. Multimedia Coding Standards
   4.5.1. JPEG, JPEG-2000
   4.5.2. H.261, H.263, MPEG-1, MPEG-2, MPEG-4, and H.264

5. Audio Information Analysis
   5.1. Audio Signal Processing fundamentals
   5.2. Deep Learning for Audio Multimedia Analysis

6. Social Network Basics
   6.1. An Introduction to Social Networks
   6.2. Properties and Models of Social Networks
   6.3. Centrality Analysis and Community Detection
   6.4. Information Diffusion in Social Networks
   6.5. Social Multimedia Analytics
   6.5.1. Sentiment, Opinion, Locations, and Multimedia
   6.5.2 Search and Recommendation in Social Media

7. Advanced Multimedia and Image Processing
   7.1. Image Manipulation Techniques
   7.2. Interactive Multimedia Editing

Textbook/Reference:
11. Selected research papers.
Mehryar Mohri, Afshin Rostamizadeh, and Ameet Talwalkar, ”Foundation of Machine Learning 2nd edition” (https://cs.nyu.edu/~mohri/mlbook/ ), 2018

Office hours: by appointment
Grades:
- Exam 50%
- Final Project 50%

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topics/Brief Description</th>
<th>Lecturers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2022/02/16</td>
<td>Introduction to Multimedia</td>
<td>Jun-Cheng Chen</td>
</tr>
<tr>
<td>2</td>
<td>2022/02/23</td>
<td>Multimedia Basics (I)</td>
<td>Wen-Hung Liao</td>
</tr>
<tr>
<td>3</td>
<td>2022/03/02</td>
<td>Multimedia Basics (II)</td>
<td>Wen-Hung Liao</td>
</tr>
<tr>
<td>4</td>
<td>2022/03/09</td>
<td>Audio Analysis in Multimedia (I)</td>
<td>Li Su</td>
</tr>
<tr>
<td>5</td>
<td>2022/03/16</td>
<td>Audio Analysis in Multimedia (II)</td>
<td>Li Su</td>
</tr>
<tr>
<td>6</td>
<td>2022/03/23</td>
<td>Fundamental of Deep Learning (I)</td>
<td>Jun-Cheng Chen</td>
</tr>
<tr>
<td>7</td>
<td>2022/03/30</td>
<td>Fundamental of Deep Learning (II)</td>
<td>Jun-Cheng Chen</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Final-Project Proposal Explanation (Milestone I)</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>2022/04/06</td>
<td>Visual Content Processing &amp; Coding (I)</td>
<td>Chia-Wen Lin</td>
</tr>
<tr>
<td>9</td>
<td>2022/04/13</td>
<td>Visual Content Processing &amp; Coding (II)</td>
<td>Chia-Wen Lin</td>
</tr>
<tr>
<td>10</td>
<td>2022/04/20</td>
<td>Image/Video Coding Standards</td>
<td>Chia-Wen Lin</td>
</tr>
<tr>
<td>11</td>
<td>2022/04/27</td>
<td>Final-Project Proposal Presentation (Milestone II)</td>
<td>Jun-Cheng Chen</td>
</tr>
<tr>
<td>12</td>
<td>2022/05/04</td>
<td>Midterm Exam</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>2022/05/11</td>
<td>Deep Learning for Image Processing Applications (I)</td>
<td>Yan-Tsung Peng</td>
</tr>
<tr>
<td>14</td>
<td>2022/05/18</td>
<td>Deep Learning for Image Processing Applications (II)</td>
<td>Yan-Tsung Peng</td>
</tr>
<tr>
<td>15</td>
<td>2022/05/25</td>
<td>Deep Learning for Image Processing Applications (III)</td>
<td>Yan-Tsung Peng</td>
</tr>
<tr>
<td>16</td>
<td>2022/06/01</td>
<td>Social Multimedia and Related Applications</td>
<td>Jun-Cheng Chen</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Final-Project Clinic (Milestone III)</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>2022/06/08</td>
<td>Polishing Up your Demo No Class</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>2022/06/15</td>
<td>Final</td>
<td>MM Faculty</td>
</tr>
</tbody>
</table>