Multimedia in Social Networks (MM)

Place: Room 108, Old Building, IIS, AS / Delta Building 601, NTHU
Time: Tue, 09:00-12:00

Course Teachers:
Dr. Yi-Hsuan Yang / Chair (CITI) Dr. Wen-Hung Liao (NCCU)
Dr. Yen-Yu Lin (CITI) Dr. Chia-Wen Lin (NTHU)
Dr. Jun-Cheng Chen (CITI)

Outline:
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. Multimedia Processing & Coding
   3.1. Video coding fundamentals
   3.2. Lossless Compression & Lossy Compression
   3.3. Transform Coding
   3.4. Motion Compensated Predictive Coding
4. Introduction to Deep Learning
   4.1. Introduction to machine learning (Supervised/Unsupervised/Semi-supervised learning, etc)
   4.2. Introduction to Neural Networks
   4.3. Why is Deep Learning taking off?
   4.4. Deep Learning Research Resources
5. Deep Learning Basics
   5.1. Supervised Learning with Neural Networks (Binary classification with Multi-layer Perceptron, etc)
   5.2. Building Blocks of Deep Neural Networks
   5.3. Training a Deep Neural Network
      5.3.1. Forward/Backward Propagation
      5.3.2. Gradient Descent for Neural Network
   5.4. pyTorch
6. Convolutional neural networks (CNNs)
   6.1. Conventional approaches vs. deep learning
   6.2. Neural networks
   6.3. Convolutional neural networks
7. Representative CNN models
   7.1. AlexNet
   7.2. VGGNet
   7.3. GoogleNet
   7.4. ResNet
   7.5. DenseNet
8. CNN-based computer vision applications
   8.1. Fine-grained object recognition
   8.2. Object detection
   8.3. Semantic segmentation
   8.4. Image super resolution
   8.5. Image style transfer
   8.6. Action and gesture recognition
   8.7. Image matching and co-segmentation
   8.8. Video frame interpolation

Textbook/Reference:
11. Selected research papers.
Office hours: by appointment
Grades:
• Exam and Assignment (50%)
• Final Project (50%) Proposal: 10% Demo: 30% Report (in IEEE Format): 10%

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<tr>
<th>Week</th>
<th>Date</th>
<th>Topics/Brief Description</th>
<th>Lecturers</th>
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<tr>
<td>1</td>
<td>2019/02/19</td>
<td>Introduction to Multimedia</td>
<td>Yi-Hsuan Yang</td>
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<td>2</td>
<td>2019/02/26</td>
<td>Multimedia Basics (I)</td>
<td>Wen-Hung Liao</td>
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<td>Multimedia Basics (II)</td>
<td>Wen-Hung Liao</td>
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<td>Visual Content Processing &amp; Coding (I)</td>
<td>Chia-Wen Lin @ Delta 601, NTHU</td>
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<td>Image/Video Coding Standards</td>
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<td>Audio/Music Analysis in Multimedia (I)</td>
<td>Li Su</td>
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<td>8</td>
<td>2019/04/09</td>
<td>Audio/Music Analysis in Multimedia (II)</td>
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<td>2019/04/23</td>
<td>Project Proposal Presentation</td>
<td>Yi-Hsuan Yang</td>
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<td>Fundamentals of Deep Learning (I)</td>
<td>Jun-Cheng Chen</td>
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<td>14</td>
<td>2019/05/21</td>
<td>Social Multimedia Applications</td>
<td>Jun-Cheng Chen</td>
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<td>2019/05/28</td>
<td>Deep Learning for Computer Vision Applications (I)</td>
<td>Yen-Yu Lin</td>
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<td>Deep Learning for Computer Vision Applications (III)</td>
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<td>19</td>
<td>2019/06/25</td>
<td>Final Project Demo and Presentation</td>
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