

MSA 8650 Image and Text Analytics with Deep Neural Networks

1. Instructor Information

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2. Class Information

- **Location:** GSU Buckhead Center, Room 306
- **Time:** Wednesday 5:30-9:45pm
- **Date:** 8/28, 9/11, 9/25, 10/09, 10/23, 11/06, 11/20, 12/04

3. Course Description:

Text documents and images have proven to be useful complements to structured data in different research fields such as marketing, information management, real estate, accounting, finance, operations management etc. This course studies how to use deep neural network methods to analyze text documents and images to solve business related problems.

4. Course Prerequisites:

Students should have coding experiences and some familiarity of how neural networks work.

5. Course Outcomes

By the end of the semester students will be able to:

- Understand image representations and basic operations
- Know low pass and high pass filters
- Understand the concepts of image segmentation, object detection and recognition
- Understand text representation and processing
- Know feedforward neural networks and applications
- Know the optimization approaches for training deep neural network models

- Understand different applications of convolutional neural networks
- Know recurrent neural networks, the long short-term memory and other gated RNNs
- Know how to use unsupervised deep learning

6. Textbooks and Resources

Lecture notes will be posted on *iCollege*.

Textbook:

1. Rafael C. Gonzalez and Richard E. Woods. *Digital Image Processing*, Pearson, 2017, 4th edition.
2. Ian Goodfellow, Yoshua Bengio and Aaron Courville. *Deep Learning*, The MIT Press, 2016.
3. Yoav Goldberg. *Neural Network Methods for Natural Language Processing*, Morgan & Claypool Publishers. 2017

7. Attendance Policy

Students are required to attend all lectures. It is strongly suggested that students do not miss class.

8. Group Project Topics and Grading:

Topics:

Topic 1: build a chatbot using auto-encoder and LSTM etc.

Topic 2: use GANs to analyze mutual fund disclosures

Topic 3: Image....

Topic 4: ...

Grading Scale:

Far exceeding expectations	92 above
Excellent	86-91%
Good	80-85%
Meets minimum req's	60-79%
Below minimum req's	<60%

The grade will be based on:

- Efforts in implementing different methods

- Accuracy of the analysis.
- Clarity and comprehensiveness of your presentation and written summary.

The student's project grade will be the group's grade with any necessary adjustments based on peer evaluations.

9. Peer Evaluation:

At the end of the course you will be asked to evaluate yourself and the other members of your group on completing the project. These ratings are used for gauging team members' contributions. The grade you and your group members receive will depend in part on these peer evaluations. Rate each member based on the following criteria: (1) participation in group activities, (2) quality of work, (3) quantity of work, (4) finishing assigned work on time, and (5) ability to work as a team member. Please use the following scale to assign scores:

5	⇒	Exceptional effort, above and beyond the call of duty
4	⇒	Above average effort
3	⇒	Normal effort (this is the expected score!)
2	⇒	Below average effort
1	⇒	Unacceptable effort

YOUR NAME: _____ **Score:** _____

Team Member #2: _____ **Score:** _____

Team Member #3: _____ **Score:** _____

Team Member #4: _____ **Score:** _____

Note: Please include a brief reason for any group member scoring either a "1" or a "5." I expect everyone to be thoughtful and diligent in completing this evaluation.

10. Grading

Percentages of course works in students' final scores are as follow:

Course Work	Percentage
Attendance and class participation	10%
Paper presentations	10%
Assignment 1	20%
Assignment 2	20%
Assignment 3	40%

The anticipated grading scale for this class is as follows:

A+	A	A -	B+	B	B-	C+	C	C-	D	F
97.0%- 100%	91.0 – 96.9 %	89.5 – 90.9%	87.0 – 89.4%	83.0 – 86.9%	79.5 – 82.9%	77.0 – 79.4%	72.0 – 76.9%	69.5 – 71.9%	60.0 – 69.4%	Below 59.9%

I do not give additional projects or extra credit work.

NOTE:

- If GSU is closed for any reason on a scheduled class day, you should be prepared to adjust the schedule accordingly. In other words, the material/exam to be covered/taken on the day in which GSU is closed will be covered/taken in the next class.
- Students are responsible for the information contained in the Academic Honesty policy found in the GSU Graduate Bulletin.

Course Schedule and Topics¹

Session	Topics	Arrangement
August 28, 2019	Image representation, intensity transformations and filtering OpenCV	
September 11, 2019	Image segmentation: edge & corner detection, Hough transform, thresholding, Feature extraction	
September 25, 2019	Assignment 1 solution review Neural network review, backpropagation, regulation, optimization methods, etc.	Assignment 1 due at the beginning of the class Papers presentation
October 9, 2019	R-CNN, Faster R-CNN, Reinforcement learning	Papers presentation
October 23, 2019	Text representation, LDA, STM, Dynamic topic model, Sentiment analysis LDA2VEC	Papers presentation
November 6, 2019	Deep learning for texts RNN, LSTM, etc.	Papers presentation
November 20, 2019	Assignment 2 presentation Autoencoder, GANs, U-Net	Assignment 2 due at the beginning of the class Papers presentation
December 4, 2019	Some current topics of advanced deep learning Assignment 3 presentation	Assignment 3 due

¹ Topics are in working process and can be changed.

Datasets:

1. Dataset for building a chatbot

<https://lionbridge.ai/datasets/15-best-chatbot-datasets-for-machine-learning/>