ECE M146 Introduction to Machine Learning

Spring 2021 Instructor: Prof. Lara Dolecek

Syllabus Date: March 29, 2021

Logistics Overview:

All the course materials will be posted on CCLE. Look under tabs labeled Week XYZ for that week's lecture and discussion materials.

How to reach your teaching staff:

Instructor and TAs will be available on Zoom through CCLE under "Office Hours" tab, as follows:

Prof. Lara Dolecek OHs:

- Mondays 9-10 am
- Wednesday 6.15-7.15 pm

Zehui (Alex) Chen OHs:

• Wednesday 2:00 pm - 3:00 pm

• Friday 3:30 pm - 4:30 pm

Zehui (Alex) Chen Discussion:

• 1A: Friday 10:00 am – 10:50 am

• 1B: Friday 11:00 am – 11:50 am

• 1C: Friday 12:00 pm – 12:50 pm

How to submit the homework and by when:

Homeworks are due at the indicated times. Please upload them on Gradescope prior to that lecture.

What is the grade breakdown:

Weekly homeworks – 45 %

Assessment 1 in week 4 – 15 %

Assessment 2 in week 8 – 15 %

Assessment 3 in week 11 – 25%

<u>What is the reading material</u>:

Recommended reading is Hal Daume's book: http://ciml.info/

The book is available free of charge.

Additional reading pointers will be provided as needed.

<u>What is this course going to cover</u>:

Detailed Weekly Schedule:

Week 1

- March 29 -- Lecture 1: Overview and math review. Reading: Daume Ch.1.1 -- 1.2. Homework 1 released.
- March 31 -- Lecture 2: Perceptron. Reading: Daume Ch. 4.

Week 2

- April 5 -- Lecture 3: Linear regression. Reading: Daume Ch. 7. Homework 2 released. **Homework 1 due at the beginning of the class.**
- April 7-- Lecture 4: More on regression, (stochastic) gradient descent. Reading: Daume Ch. 7.

Week 3

- April 12 -- Lecture 5: Logistic Regression, Maximum Likelihood, Loss Functions. Reading: Daume Ch. 7. Homework 3 released. **Homework 2 due at the beginning of the class.**
- April 14 -- Lecture 6: Decision Trees. Reading: Daume: Ch. 1

Week 4

- April 19 -- **Lecture 7: Assessment 1**

- April 21 -- Lecture 8: kNN; cross validation; multi class classification. Daume Ch. 3.1 - 3.2, 5.6, 6.2.

Week 5

- April 26 -- Lecture 9: SVM. Reading: Daume Ch. 7.7, 11.5 and 11.6. Homework 4 released. **Homework 3 due at the beginning of the class.**

- April 28 -- Lecture 10: Kernels Soft SVM and regularization. Reading : Daume Ch. 7 and 11

Week 6

- May 3 -- Lecture 11: Naive Bayes: Reading: Daume Ch. 9.1 - 9.3. Homework 5 released. **Homework 4 due at the beginning of the class.**
- May 5 -- Lecture 12: Gaussian discriminative analysis. Reading: Daume Ch. 9.5 - - 9.7

Week 7

- May 10 -- Lecture 13: Gaussian discriminative analysis. Reading: Daume Ch. 9.5 -- 9.7. Homework 6 released. **Homework 5 due at the beginning of the class.**
- May 12 -- Lecture 14: Unsupervised learning. K-means clustering. Reading: Daume Ch. 15.1

Week 8

- May 17 -- Lecture 15**: Assessment 2**
- May 19 -- Lecture 16: PCA, eigen value decomposition. Reading: Daume Ch. 15.2

Week 9

- May 24 -- Lecture 17: EM and soft kmeans. Homework 7 out. **Homework 6 due at the beginning of the class.**
- May 26 -- Lecture 18: Ensemble methods. Reading: Daume Ch. 13

Week 10

- May 31 -- Lecture 19: **No class, University holiday.**

- June 2 -- Lecture 20: Review and advanced topics. **Homework 7 due at the beginning of the class.**

Week of finals

- **Assessment #3 (cumulative final exam).**