

# CS591-002: Advanced Machine Learning: Networks and Graphs

Spring 2008  
Mon/Wed/Fri 2:00-2:50  
ME-208

**Instructor** Terran Lane

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**Office Hours** Wed, 9:00 AM-11:00 AM

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## 1 What We're All Doing Here

We'll cover selected recent topics in machine learning. That basically means that we'll be reading papers from the ML literature and analyzing/critiqueing them. The goal is to understand the scope of work being done in one or more sub-fields of cutting-edge ML.

We'll focus on networks and relations – learning the structure of graphs, predicting the behavior of functions on networks, learning in general relational models, and so on. But I'm open to other topics as well. I encourage (and expect!) members of the class to pick papers and suggest topics.

## 2 Assignments, Grades, and Other Stuff Like That

This is primarily a reading and discussion course, so there are no fixed programming or math assignments as such. Grades will be based on four components:

**Critiques** Short written critiques of the papers we're reading.

**Participation** Participation in in-class discussions. Asking/answering questions, pointing out new directions, etc.

**Reviews/presentations** Every member of the class will be responsible for presenting papers and leading the discussion of them.

**Final project** More on this later.

### 2.1 Critiques

For every paper we read that you are *not* presenting, you're expected to prepare a short critique. (Those who are leading discussions of the papers are exempt from writing a separate critique.) The critique is limited to **one page** and must contain the following:

**Abstract** A one paragraph description of the content of the paper. This *must* be your own abstract, based on your understanding of the paper. Please do *not* simply copy the paper's abstract. The point is to see how you understood the paper, and for you to get practice in writing abstracts/summaries.

**Discussion** 1–3 paragraphs discussing the paper. This could include thoughts on what was the key idea, strengths or weaknesses of the methods/experiments, comments on the writing, ways to extend the work, flaws in the argument/data/experiments, etc.. Anything is fine, so long as it demonstrates some real thought.

### 3 Schedule

All of the following papers should be available online if you're coming from a UNM address. If you're trying to get them from off-campus, you may have to go via the UNM Libraries, who have a signon that will authenticate you for some of the journal sites.

**Wed, Jan 23** Intro day. Administrivia. Discussion: what are we all doing here?

#### GOFML

**Fri, Jan 25** Caruana and Niculescu-Mizil (2006).

**Mon, Jan 28** Charniak (1991), Friedman et al. (1997) (Crit only for Friedman et al.)

**Wed, Jan 30** Discussion/lecture.

**Fri, Feb 1** (Müller et al., 2001) (Sections I–IV(A), VII(A)–(B))

#### Node/Edge Classification

**Mon, Feb 4** Lu and Getoor (2003).

**Wed, Feb 6** Discussion/lecture. *Happy new moon!*

**Fri, Feb 8** Neville and Jensen (2003)

**Mon, Feb 11** Jensen et al. (2004)

**Wed, Feb 13** Discussion/lecture.

**Fri, Feb 15** Macskassy and Provost (2005)

**Mon, Feb 18** Zhao et al. (2006)

**Wed, Feb 20** Discussion/lecture. *Full moon!*

**Fri, Feb 22** Richardson and Domingos (2006)

**Mon, Feb 25** TBD

**Wed, Feb 27** Lecture/discussion.

**Fri, Feb 29** TBD *Leap Year Day!*

### **Graph Structure Identification**

**Mon, Mar 3** Friedman and Koller (2003)

**Wed, Mar 5** CSUSC. *Class encouraged to attend the conference!*

**Fri, Mar 7** Burge and Lane (2005)

**Mon, Mar 10** Bilgic et al. (2007)

**Wed, Mar 12** Discussion/lecture.

**Fri, Mar 14** Clauset et al. (2006) *Beware the ides of March!*

**Mar 17–21** *Spring break. I won't be here. You shouldn't either.*

### **Laplacian Methods**

**Mon, Mar 24** Mahadevan (2005b)

**Wed, Mar 26** Lecture/discussion.

**Fri, Mar 28** Mahadevan (2005a)

**Mon, Mar 31** Zhou and Schölkopf (2004)

**Wed, Apr 2** Lecture/discussion.

**Fri, Apr 4** Agarwal et al. (2006)

**Mon, Apr 7** TBD

**Wed, Apr 9** TBD

**Fri, Apr 11** TBD

### **String and Graph Kernels**

**Mon, Apr 14** Cortes et al. (2004)

**Wed, Apr 16** Lecture/discussion

**Fri, Apr 18** Bunke (1997)

**Mon, Apr 21** Wegner et al. (2005)

**Wed, Apr 23** Lecture/discussion.

**Fri, Apr 25** (Kashima et al., 2003)  
**Mon, Apr 28** (Gärtner et al., 2003)  
**Wed, Apr 30** TBD  
**Fri, May 2** TBD  
**May 5–9** Final project presentations.

## References

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