LING 506: Topics in Computational Linguistics

Affective Computing: Detecting Emotions in Text

Fall 2020

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Office hours: W 9:00 – 10:15am (virtual)

**Course Days/Times:**

M 9:00 – 10:20am; Location: virtual

**Course Description**

Although there is no consensus among scholars on a general definition of emotion, we know that emotions are powerful forces influencing our everyday behavior, from cognition, perception, to everyday tasks such as learning, communication, and even decision-making.

**Affective computing** is the study and development of systems and devices that can recognize, interpret, process, and simulate human affects. It is an interdisciplinary field that relies on a large variety of knowledge and skills from engineering / computer science to linguistics, psychology / cognitive science, neuroscience, sociology, education, psychophysiology, psychiatry, value-centered design, ethics, and more.

Given that emotions are central and basic to human interaction, affective computing researchers are interested in understanding and modeling emotions into artificial systems that interact with humans. Currently, research is focused on 4 major dimensions:

1. Understanding and applying basic theories of emotion, from psychological, sociological, and neuro-scientific perspectives to various domains;
2. Devising techniques to recognize emotions from various signals including written language, speech, heart rate, skin conductance, eye gaze and body language.
3. Modeling emotions in human-machine interaction systems, such as conversational systems, avatars, assistive technologies, and chatbots.
4. Applying theories of emotion to particular domains/applications, and identifying the best ways to integrate both recognition and generation of affect for the development of a more efficient, believable, useful and enjoyable intelligent interactive systems.

This course provides an introduction to some of the major concepts and recent developments in the field of Affective Computing – in particular, those related to natural language. It introduces material that is relevant both to computer science and linguistics, as well as other fields such as psychology, philosophy, sociology, and anthropology (as related to language behavior and behavior in language). This course also introduces some basic theories of human emotion (how it arises from and influences cognition, the body and the social environment), computational techniques for modeling human emotion processes as well as for recognizing and synthesizing emotional behavior.

**Learning Outcomes**

The goal of this course is to provide an overview of the field and applications of Affective Computing, including concepts, methods, and tools from both a *Theoretical Linguistics* and a *Language Engineering* perspective. Students will become familiar with techniques and tools needed to develop basic affective computing systems, from sentiment analysis to computational social meaning. Topics related to emotion detection and understanding may include detection of speaker's sentiments, emotions, empathy, opinions and beliefs, sarcasm, deception, persuasion, perspective, power and influence, politeness, and personality.

On completion of this course, students should:

* Understand some of the main challenges in human-computer affective and communicative interaction in text;
* Demonstrate knowledge in current and important theories and trends in designing emotionally and socially sensitive technology, as well as recent advances in affective computing for written language;
* Understand the state of the art in the collection, analysis, representation and evaluation of affective behavior data;
* Demonstrate basic ability to computationally analyze affective and/or social behavior in data;
* Demonstrate critical thinking, analysis and synthesis about 'when' and 'how' to incorporate emotions in some application contexts, and
* Gain basic practical experience in proposing and justifying computational solution(s) for emotion detection in text.

**Prerequisites:**

Background in Computational Linguistics / Natural Language Processing (e.g., LING 406 / CS 447 or equivalent) is required. Background in Machine Learning is a plus. Otherwise, students should obtain the consent of instructor (girju@illinois.edu).

**Course Materials:**

The course will be a combination of lectures by the instructor and student-led presentations and discussion of recent research papers in the field. With the research papers, students will be responsible for presenting them in class and discussing them.

**Grading Scheme**

Grading breakdown:

|  |  |
| --- | --- |
| Class participation | 30% |
| Paper presentation | 20% |
| Term Project | 50% |

A-F Grading Scale (per overall percentages):

* A+: >= 100
* A: [90 – 100)
* A-: [80 - 90)
* B+: [70 - 80)
* B: [60 - 70)
* C: [50 - 60)
* D: [45 - 50)
* F: < 45

Note: The grading scale is subject to change, depending on the level of the class.

**Class Participation:**

Students are required to actively participate in the paper reading sessions (the number of such papers is to be determined based on class size) during the semester. Specifically, they will read each paper and, if they are not presenting it, they will also create a 2-page report summarizing the paper (i.e., follow the *Research Paper Summary Outline* on compass2g). Each student will be evaluated based on:

* their research paper summary report (50%), and
* their active involvement during the Q&A session at the end of each paper presentation (50%) during the semester (i.e., asking relevant questions as well as commenting on various aspects of the paper, and contributing to the discussion).

Note: Students are allowed to miss up to 3 paper presentations (but not of their own!) during the semester and not submit up to 2 research paper summaries. Students are expected to actively participate in the Q&A sessions of at least half of the presentations during the semester for full credit.

**Paper Presentation**:

Each student is required to read and present 1- 4 papers (number to be determined based on class size) during the semester. For each paper they have to present, students will create presentation slides what will summarize the main points (problem definition, importance and challenges, research assumptions, data description, approach, models, and results, as well as discussion and conclusions). Each presentation will take 20 min. followed by a 15-20 min. Q&A session. Students are not required to submit a paper summary for the paper they present. Students will be graded on:

* their presentation skills (clarity of presentation, use of time, adequate speed; ability to elaborate on presentation points and not just read from the slides) (20%),
* slides content (organization/outline; to what extent the slides reflect the content of the research paper; clarity and coherence of content; effective use of facts, statistics, details, and citations) (50%), as well as
* ability to answer questions from the audience (30%).

**The Term Project** is meant:

1. to give students the opportunity to apply various concepts, theories, and models taught in the course to solve some text analytics problem related to emotions;
2. to allow students to explore new ideas and techniques for text analytics by working on a real world problem.

Projects are a key focus of the course, and can be developed individually or as part of a team (2-3 students). The term project will be mainly student- or student-instructor designed on a particular topic of relevance to the course. Team projects will be developed in 2-3 person teams (with a strong preference for interdisciplinary teams). Potential project ideas will be discussed with each student. However, due to the interdisciplinary nature of the class, the instructor will be quite open to a wide range of ideas (if related to the theme of the class).

Each student has to send in first a project proposal (accounting for 10% of the total Term Project points) by the due date which will be specified in the Syllabus. The term project deliverables include the project code repository (via github) and a term paper in a form suitable for a submission to a conference (details will be provided in the Term Project folder on compass2g).

**Disability Accommodations**

To obtain disability-related academic adjustments and/or auxiliary aids, students with disabilities must contact the course instructor and the Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES, you may visit 1207 S. Oak St., Champaign, call 333-4603, e-mail [disability@illinois.edu](mailto:disability@uiuc.edu) or go to the [DRES website](https://www.disability.illinois.edu/).  If you are concerned you have a disability-related condition that is impacting your academic progress, there are academic screening appointments available on campus that can help diagnosis a previously undiagnosed disability by visiting the DRES website and selecting “Sign-Up for an Academic Screening” at the bottom of the page.

**Academic Integrity**

Students should understand the basics of *academic integrity* particularly as it applies to *plagiarism and class participation*. We will review this point briefly on the first day of class. This issue will come up particularly in assignments and other exercises that require students to write summaries of other people's ideas. It is expected that students know how to quote appropriately, that they know not to use other people's material without proper attribution (including close paraphrases of other scholars' prose).  For further information see the Student Code [here](http://studentcode.illinois.edu/): <https://studentcode.illinois.edu/>

The assignments are designed to ensure that every student has a good understanding of the models and theories explained in class and gains hands-on experience, thus the students are generally required to complete them *independently* unless it is a group assignment. Discussion with others is allowed to the extent of helping understand the material. The course newsgroup may be a good place for discussions. The purpose of student collaboration is to facilitate learning, not to circumvent it. The actual solution must be done by each student alone, and the student should be ready to reproduce their solution upon request. If any substantial discussion happens, every one involved must write down the names of the people that he/she has discussed with and the nature or topic of discussion. In any case, you must exercise academic integrity.

**Attendance**

Students are expected to attend the class lectures and discussions. Absences will be reported if they become excessive (i.e., the student misses more than two consecutive assignments). The college does not provide excuses for missed classes or assignments during the semester (see the [Student Code](http://studentcode.illinois.edu/" \t "_blank)). **Notify** your instructor(s), the emergency dean in [U of I's Office of the Dean of Students,](http://www.odos.illinois.edu/" \t "_blank) and[LAS Student Academic Affairs](https://las.illinois.edu/academics/advising/college). In the event of an emergency that will require students to be absent from class, we strongly encourage you to contact the Emergency Dean in the Dean of Students Office (333-0050).

**Inclusivity Statement**

The effectiveness of this course is dependent upon the creation of an encouraging and safe classroom environment. Exclusionary, offensive or harmful speech (such as racism, sexism, homophobia, transphobia, etc.) will not be tolerated and in some cases will be subject to University harassment procedures. We are all responsible for creating a positive and safe environment that allows all students equal respect and comfort. I expect each of you to help establish and maintain and environment where you and your peers can contribute without fear of ridicule or intolerant or offensive language.