

LING 582

Advanced Statistical Natural Language Processing

Gus Hahn-Powell

Welcome to the course

GHP

Neural approaches to NLP

Course Objectives

In this course, we will . . .

- cover fundamental concepts related to neural approaches to statistical natural language processing, such as . . .
- multi-layer perceptrons (MLPs)
- convolutional neural networks (CNNs)
- recurrent neural networks (RNNs)
- encoder-decoder architectures
- contextual embeddings
- large language models (LLMs)
- attention mechanisms

Build and evaluate with PyTorch

- foster technical skills, such as . . .
- familiarity using the University of Arizona's HPC
- familiarity using the PyTorch library
- linux command line basics
- virtualization and Containerization technologies
- version control (ex. git) and the feature branch workflow

Your course home

COURSE RUN

ling-582

Advanced Statistical Natural Language Processing

Your role in this run: student

Selected run

ling-582

▼

General

Notifications

Units

Calendar

Progress

Forum

Guides

General

Paper review

Class competition

Course project

Choose your course

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- General
- Notifications
- Units
- Calendar
- Progress
- Forum
- Guides

General

Begin with Getting Started

Unit

All units

Getting started and review

Confirm your course setup, introduce yourself, and review the Python and NLP foundations needed for the course. Work through the preceding units in order, using the activity deadlines in CM to pace your practice.

Unit 1 Check-In

Survey

Complete the check-in early so we can help with preparation and access.
Open from the General tab.

Required: Forgejo and Class Maestro basics

Link

Show details

Required: SSH keys for Git

Link

Show details

Optional: full development environment setup

Link

Optional reference for setting up a complete local development environment. Forgejo sign-in and SSH key registration are still required; use the separate setup links in this unit.

Model Gateway basics

Find the course materials

Unit resources

Unit

Introduction to deep learning for NLP · Not y ▾

Introduction to deep learning for NLP

Connect linear classifiers and learned word representations to neural networks, loss functions, and gradient-based learning.



Introduction to deep learning for NLP: overview

Link

Read the unit guide and follow its tutorial and lecture links.



Unit 1: Introduction and PyTorch practice

Etude lesson

► [Show details](#)

Writing, calendar, and feedback

—

Writing · assignments and reviews

—

Calendar · subscribe to the feed

—

Progress · activity status and released grades

Course walkthrough · assignment overview

GHP

Subscribe to the course calendar



Course calendar

Deadlines and release dates. Subscribe by URL in your calendar app so later CM updates can appear after refresh.

Course calendar subscription URL

Copy URL



Open feed

Check your progress

Progress

Coursework

Self-tracked units

Show

► Advanced

All work

▼

PROGRAMMING ASSIGNMENT

Class competition: code repository

No due date

At due date

No due date

Latest

Latest on main

Upcoming

PROGRAMMING ASSIGNMENT

Course project: shared code repository

No due date

At due date

No due date

Latest

Open repository to review latest work

Available

ETUDE

Unit 1: Introduction and PyTorch practice

At due date

No event

Practice

No event

Not started

Class Maestro · student view

GHP

LING 582 | Your course home

Video 00:56 (approx.)

10 / 40

Open the assignment for current requirements

Markdown

Question
What would a useful comparison tell us?

Plan
Start with a baseline and one focused comparison.

 Save draft

 Submit writeup

Not submitted

Illustrative demonstration · actual interface

GHP

Build on the foundations

01

PyTorch and neural
networks

02

Convolutional and
sequence models

03

Attention, transformers, and
language models

Lessons, examples, and practice

Unit resources

Unit

Introduction to deep learning for NLP · Not y ▾

Introduction to deep learning for NLP

Connect linear classifiers and learned word representations to neural networks, loss functions, and gradient-based learning.



Introduction to deep learning for NLP: overview

Link

Read the unit guide and follow its tutorial and lecture links.



Unit 1: Introduction and PyTorch practice

Etude lesson

► [Show details](#)

Practice as you go



Short exercises to test and refine your understanding

Required questions

Code checks

Saved responses

Complete the required questions

01

Run code checks

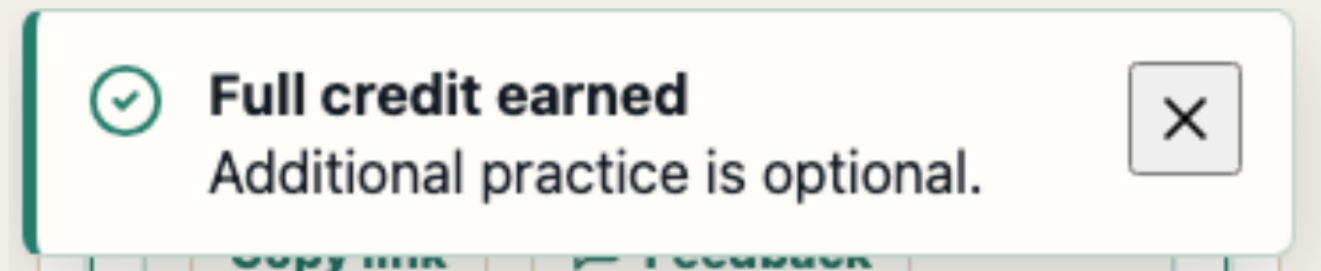
02

Save other responses

03

Check the activity's credit status

Check credit, then keep practicing



Check the activity's credit status.

Then use the additional exercises for more practice.

Illustrative demonstration · actual interface

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Read a paper that interests you

—

Choose a paper related to NLP or deep learning

—

Read it yourself

Compare what evidence the model receives

- Citation only
- Paper text provided

Check claims against the paper

01

Find the supporting passage, table, or figure

02

Record what the model said

03

Explain what you can verify

The main idea

A documented failure is a useful result

Later: tools for accessing evidence

01

Paper

02

Tools

03

Model answers to check

The main idea

A shared task to investigate

Get an initial system working end to end

01

Inspect the data and metric

02

Build an initial system

03

Make a scored Kaggle submission

A starting point and a next experiment

—

Explain the initial system

—

Propose a small comparison

—

Revise the plan as you learn

Explain what you learned

01

Comparisons

02

Error analysis

03

Conclusions supported by
evidence

Keep code and explanation connected

- Repository · runnable code and instructions
- Class Maestro · writeups

Investigate a question of your own

—

Work individually or with a small group

—

Choose a question in statistical NLP

Keep the investigation manageable

01

A focused question

02

A useful comparison

03

A realistic scope

Register, plan, then report

01

Follow the project
registration instructions

02

Submit a planning sketch

03

Submit a final report

Two complementary deliverables

—

Repository · code and run instructions

—

Report · decisions and results

A brief private reflection

—

Your contributions

—

Collaboration and
understanding

—

Private to you and
instructors

Start from the template

Markdown

Question
What would a useful comparison tell us?

Plan
Start with a baseline and one focused comparison.

 Save draft

 Submit writeup

Not submitted

Illustrative demonstration · actual interface

GHP

Saving a draft does not submit it

—

Save · keep your work in progress

—

Submit · send the assignment when ready

Writing → Reviews

Question What can a simple comparison teach us? Plan I will compare approach 2 against a baseline on held-out training data. Next experiment Inspect disagreement cases before revising the approach.	In your own words, what is the author proposing to try? What, if anything, would help you understand the plan better? * 1-3 sentences The author plans to compare a baseline with a second approach on held-out data. Identify one specific idea, choice, or observation that seems promising. Why is it worth exploring? * 1-3 sentences The planned inspection of disagreement cases seems useful because it may reveal systematic errors. Suggest one experiment, comparison, diagnostic, or clarification that could help the author move forward. What would it help them learn? * 1-3 sentences Compare errors by class before changing the model; this may show which part of the approach needs attention.
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Illustrative demonstration · actual interface

Give the author something useful

01

Read the sketch

02

Answer the guided
questions

03

Submit each review

Review completion is assessed separately

—

Completion counts toward Review and Mastery

—

Peer comments do not determine the author's grade

Use Forum to reach the course discussion

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Start with the next small step

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Model Gateway basics

You can begin before you know the solution

01

Read the assignment

02

Think about the question

03

Ask for help when needed

What will you investigate?

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Read · Think · Ask · Investigate

Course walkthrough · assignment overview

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