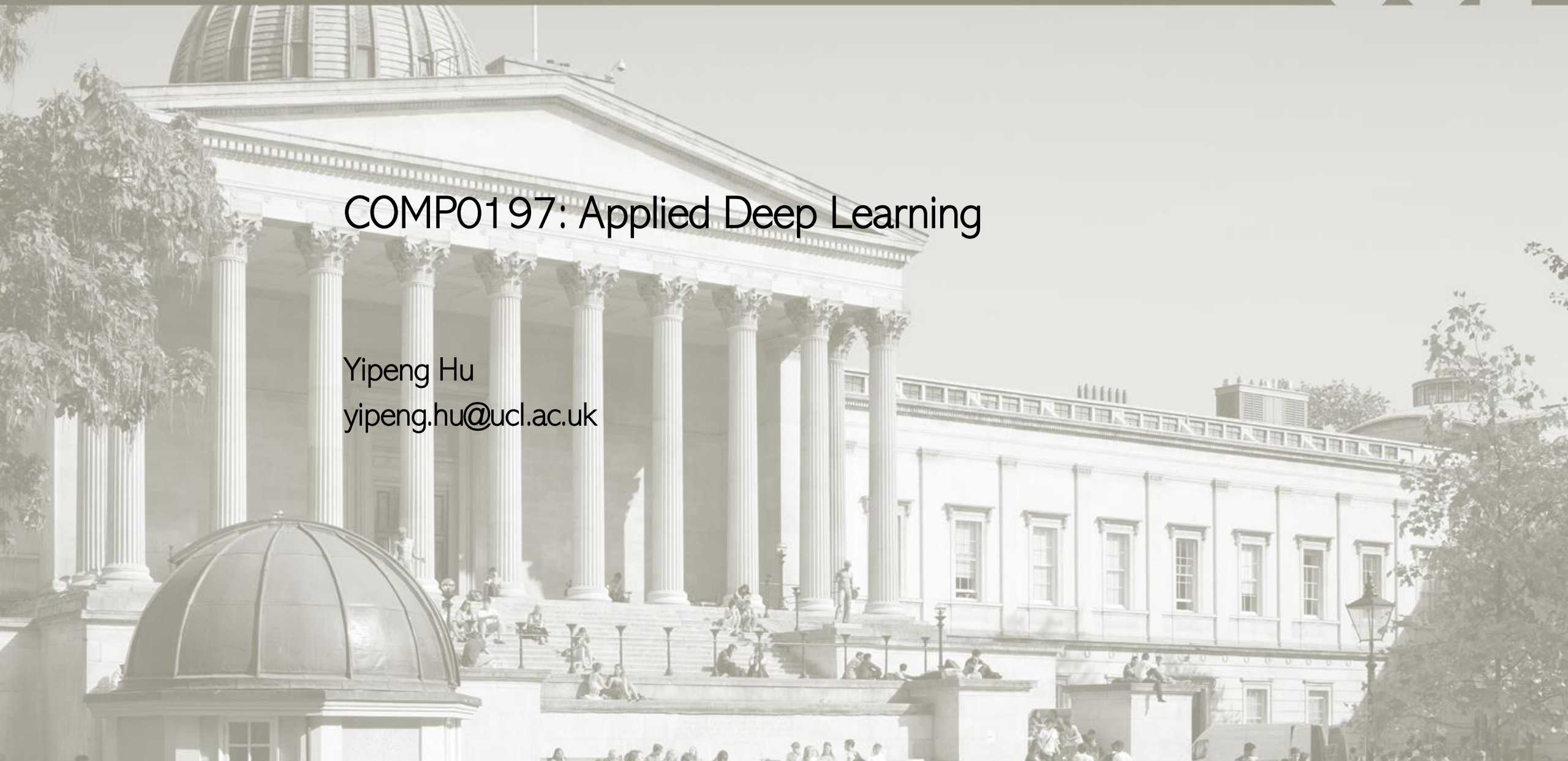


COMP0197: Applied Deep Learning

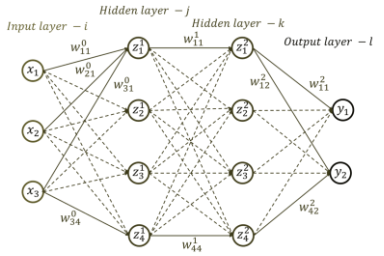
Yipeng Hu
yipeng.hu@ucl.ac.uk

Lectures

Labs (Hands-on sessions / Office hours)

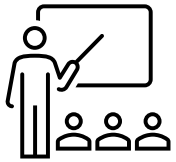
The module repository

Assessment



Applied Deep Learning| Lectures

1st – 5th Weeks (10 lectures, before the reading week):



- Deep feedforward neural networks: architecture
- Deep feedforward neural networks: training

- Convolutional neural networks
- Computer vision applications 

- Sequence modelling
- Natural language processing applications 

- Regularisation
- Evaluation

6th – 7th Weeks (3 lectures, after the reading week):

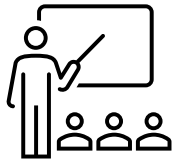
"Classical" machine learning

- Machine learning basics
- DL and ML
- Applications with ML and/or DL

by Dr Andre Altmann
(Deputy module lead)

8th – 9th Weeks (3-5 guest lectures):

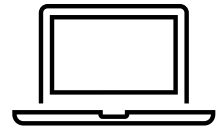
Selected research topics



- Geometric deep learning (Yunguan Fu)
- Deep reinforcement learning (Shaheer Saeed)
- Deep model interpretation (Sophie Martin)

……

Applied Deep Learning| Labs



The lab / hands-on sessions

- In lecture theatre, on your laptop, with tutors
- During lectures: CV and NLP applications, 24th Jan, 31st Jan
- After lectures: 7th March onwards, labs (± guest lectures)
- These will also be the additional “office hours”

Office hours: 9am Wednesday, 1a Charles Bell House / Teams

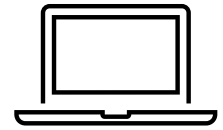
Tutors

Sophie Martin

Qi Li

Shaheer Saeed

Iani Gayo



Computing facilities

- Laptops (Linux, Windows, Mac, ChromeOS),
- Alternatives: CSRW, other UCL/CS HPCs
- GPUs*
- Jupyter notebook and Colab*

Development environment

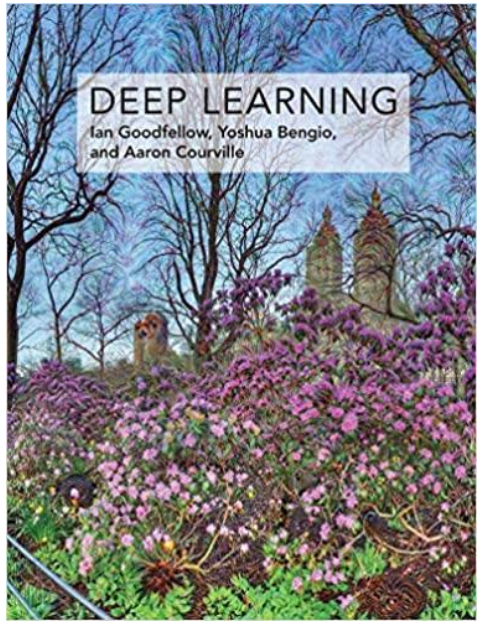
- Python
- TensorFlow and PyTorch (the official tutorials as the “homework”)
- Conda
- Module repository* and available technical support

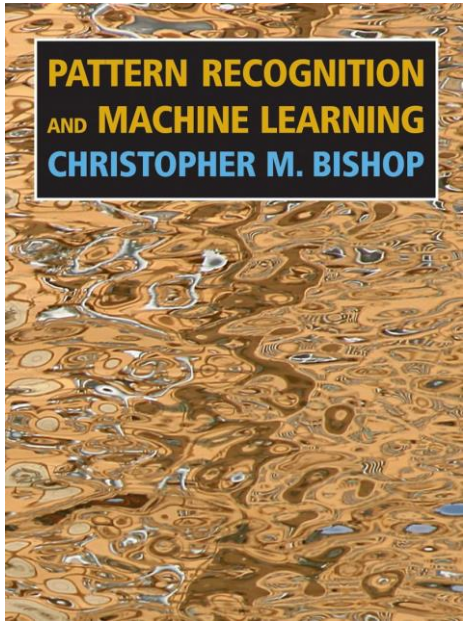
Applied Deep Learning| The Module Repository

GitHub: https://github.com/YipengHu/COMP0197

The "/docs" folder

- Links to tutorials for Python
- Links to tutorials for TensorFlow and PyTorch
- Links to install "supported" development tools, Linux/WSL, Conda, VSC
- Reading list
- The textbooks





GitHub: https://github.com/YipengHu/COMP0197

The "/tutorials" folder

- CNNs for image classification
- CNNs for semantic segmentation
- RNNs for text classification
- RNNs for character generation
- VAE
- GAN

Applied Deep Learning| Assessment

Formative assessment (not compulsory, not assessed)
- Questions and Challenges in the tutorials
- Tutorials for TensorFlow and PyTorch
- Tutorials for development tools

- Feedback from tutors

- Be hands on!

Assessed components

Component 1 – Coursework (individual) 50%
Release: 21st Feb, Submission: 17th Mar (Friday, 16:00pm)

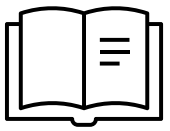
Component 2 - Project (group) 25%
Release: ~21st Feb, Submission 7th April

Component 3 - Report (individual) 25%
Release: ~21st Feb, Submission 7th April

What to assess:
- DL algorithms, evaluation and application development and DL problem solving
- Good programming and development practice
- Code and report

Applied Deep Learning| Seasonal Deep Learning

1940s: Programable computer



1950: The Turing Test

1950s, 60s: “Fully intelligent machines will be built in 10-20 years”…

1958, H. A. Simon and Allen Newell: "within ten years a digital computer will be the world's chess champion" and "within ten years a digital computer will discover and prove an important new mathematical theorem."[80]
1965, H. A. Simon: "machines will be capable, within twenty years, of doing any work a man can do."[81]
1967, Marvin Minsky: "Within a generation ... the problem of creating 'artificial intelligence' will substantially be solved."[82]
1970, Marvin Minsky (in Life Magazine): "In from three to eight years we will have a machine with the general intelligence of an average human being."[83]

1958: Perceptron/connectionism

Rosenblatt, Frank (1957). "The Perceptron—a perceiving and recognizing automaton". Report 85-460-1. Cornell Aeronautical Laboratory.

1973: “The Lighthill report”

- Artificial Intelligence: A General Survey, James Lighthill
- Robotic, Language processing

1970s – 80s: “The first AI winter”

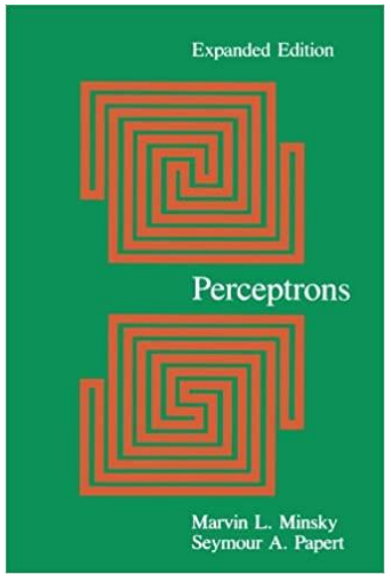
1969, 70s, 1987: Perceptrons: an introduction to computational geometry, Marvin Minsky and Seymour Papert

1980-1987: Expert systems and knowledge revolution

1985-1997: Deep Blue

1970s: Backprop / automatic differentiation

1986: Parallel distributed processing



1987 – 90s: "The second AI winter"

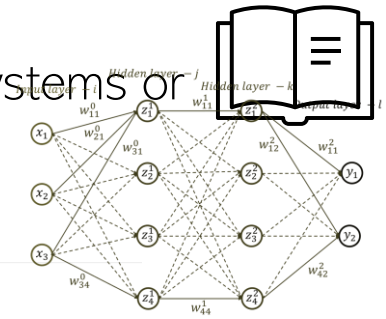
Why do we see so many synonyms of AI: Informatics, knowledge-based systems, cognitive systems or computational intelligence…

2000s:

Autonomous cars
Speech recognition / NLP
Computer vision

2011: Deep learning

Big data
Faster computers/GPUs
Deeper neural networks



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Published: 27 May 2015

Deep learning

Yann LeCun, Yoshua Bengio & Geoffrey Hinton

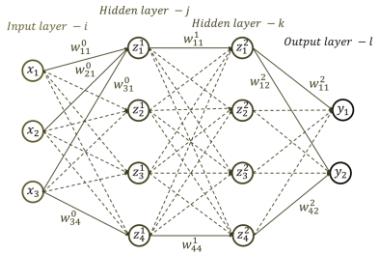
Nature **521**, 436–444 (2015) | Cite this article

647k Accesses | **24119** Citations | **1040** Altmetric | Metrics

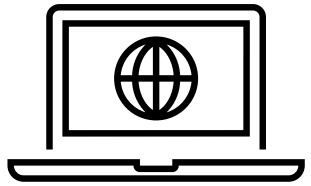
Abstract

Deep learning allows computational models that are composed of multiple processing layers to learn representations of data with multiple levels of abstraction. These methods have dramatically improved the state-of-the-art in speech recognition, visual object recognition, object detection and many other domains such as drug discovery and genomics. Deep learning discovers intricate structure in large data sets by using the backpropagation algorithm to indicate how a machine should change its internal parameters that are used to compute the representation in each layer from the representation in the previous layer. Deep convolutional nets have brought about breakthroughs in processing images, video, speech and audio, whereas recurrent nets have shone light on sequential data such as text and speech.

Lectures
Labs (Hands-on sessions / Office hours)
The module repository
Assessment



Be hands-on!



And enjoy applying deep learning!