Differentiate your Objective

COMP6248 Differentiable Programming
(and some Deep Learning)

Jonathon Hare

Vision, Learning and Control
University of Southampton

Remaining lectures

- The following topics will be covered as full 45-minute video lectures:
    - Embeddings
    - Auto-encoders, unsupervised learning and self-supervision
    - Differentiable relaxations and reparameterisations
    - Generative Models

Remaining lectures

- The following topics will be covered as full 45-minute video lectures:
  - Embeddings
  - Auto-encoders, unsupervised learning and self-supervision
  - Differentiable relaxations and reparameterisations
  - Generative Models
- Some assorted topics will also be covered in shorter videos.

Remaining lectures

- The following topics will be covered as full 45-minute video lectures:
  - Embeddings
  - Auto-encoders, unsupervised learning and self-supervision
  - Differentiable relaxations and reparameterisations
  - Generative Models
- Some assorted topics will also be covered in shorter videos.
- You'll be able to ask questions via Teams and Slack. We'll also experiment with a live Q&A session using Blackboard Collaborate.

Remaining lectures

- The following topics will be covered as full 45-minute video lectures:
  - Embeddings
  - Auto-encoders, unsupervised learning and self-supervision
  - Differentiable relaxations and reparameterisations
  - Generative Models
- Some assorted topics will also be covered in shorter videos.
- You'll be able to ask questions via Teams and Slack. We'll also experiment with a live Q&A session using Blackboard Collaborate.
- All the video content is on Blackboard (but perhaps more usefully linked directly from the module page).

There will be two lectures each week. The lecture slots are on predominantly on Mondays at 9 and Fridays at 5 (sorry! I have no control over this), although a few of the Friday slots have been shuffled to Wednesdays. The current working timetable/plan is below, and illustrates the topics I intend to cover, but this will evolve as the course progresses. Many of the lectures are coupled with assigned reading materials that you should read before the lecture takes place. This will broaden your understanding of the topic whilst giving you the skills required to read and understand the key points from recent research literature. The lectures are broadly broken into three groups: fundamentals (weeks 1-4), architectures (weeks 5-8), and advanced topics (weeks 9-12).

The table below has been updated with links to lecture videos and two of the planned lectures removed as a result of COVID-19.

Week	Date	Location	Topic	Handouts	Reading Material	Lecture Video
1	27-Jan	Avenue L/T A	Intro and background	intro-handouts.pdf		link
	31-Jan	67/1037	Review of fundamentals	mlreview-handouts.pdf	CH 3 of Michael Nielsen's Book	link
2	03-Feb	Avenue L/T A	The Power of Differentiation	differentiate-handouts.pdf		link
	07-Feb	67/1037	Perceptrons, MLPs and Backpropagation	backprop-handouts.pdf	Learning representations by back-propagating errors	link
3	10-Feb	Avenue L/T A	Automatic Differentiation	autograd-handouts.pdf	Automatic differentiation in PyTorch	link
	12-Feb	SUSU Cinema	Optimisation	optimisation-handouts.pdf	Adam: A Method for Stochastic Optimization	link
4	17-Feb	Avenue L/T A	Deeper Networks: Universal approximation, overfitting and regularisation	deepnetworks-handouts.pdf	Dropout:A Simple Way to Prevent Neural Networks from Overfitting	link
	28-Feb	SUSU Cinema	A Biological Perspective	biological-inspiration-handouts.pdf		link
5	24-Feb	Avenue L/T A	Guest Lecture - Ethan Harris - Visualising Neural Networks	visualisation-handouts.pdf		link
	19-Feb	67/1037	Convolutional Networks	Convolution-handouts.pdf	handwritten digit recognition with a back-propagation network	link
6	02-Mar	Avenue L/T A	Networks Architectures for image classification	Architectures-handouts.pdf	ImageNet Classification with Deep Convolutional Neural Networks, Striving for Simplicity: The All Convolutional Net, Very Deep Convolutional Networks for Large-Scale Image Recognition, Going Deeper with Convolutions, Deep Residual Learning for Image Recognition	link
	06-Mar	67/1037	Networks Architectures for image classification (II)	as above		link
7	09-Mar	Avenue L/T A	Recurrent Neural Networks	rnn-handout.pdf	The Unreasonable Effectiveness of Recurrent Neural Networks	link
	13-			lstm-		

Remaining labs

- Labs will run as before starting on the Wednesday 29th April for three weeks.

Remaining labs

- Labs will run as before starting on the Wednesday 29th April for three weeks.
- Demonstrators will be available in Teams and Slack during the normal lab hours (9-11 AM BST).

Remaining labs

- Labs will run as before starting on the Wednesday 29th April for three weeks.
- Demonstrators will be available in Teams and Slack during the normal lab hours (9-11 AM BST).
- You can use colab or log onto lab machines remotely if you want to.

Remaining labs

- Labs will run as before starting on the Wednesday 29th April for three weeks.
- Demonstrators will be available in Teams and Slack during the normal lab hours (9-11 AM BST).
- You can use colab or log onto lab machines remotely if you want to.
- New handin date for lab exercises: 20th May.

Online quiz 2

- New (proposed) date: Thursday 14th May.
- As before you'll have 1 hour to complete it.
- I'll keep it open to start for 24 hours this time.

Group Coursework

- Continue as before...

Group Coursework

- Continue as before...
- Ask the demonstrators or me questions during the online lab sessions.

Group Coursework

- Continue as before...
- Ask the demonstrators or me questions during the online lab sessions.
- The deadline will be extended to the 16:00 on the 29th May.