COMP90042 LECTURE 1 A

# SUBJECT OVERVIEW

# COURSE OVERVIEW

## Text processing

- Machine learning from words and documents
- Structure prediction, words as sequences and trees

## Search

- Efficient information retrieval
- Exploiting the structure of the web

## End tasks

- Translation, information extraction, question answering

# PREREQUISITES

- COMP90049 / COMP30018 “Knowledge Technologies” or COMP30027 “Machine Learning”
- Some Python programming experience
- No knowledge of linguistics or advanced mathematics is assumed
- Caveats – Not “vanilla” computer science
  - Involves some basic linguistics, e.g., syntax and morphology
  - Requires some maths, e.g., algebra, optimisation, linear algebra, dynamic programming

# EXPECTATIONS AND OUTCOMES

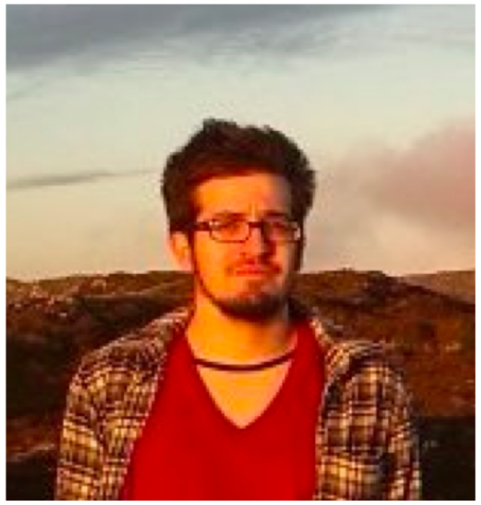
- Expectations
  - develop Python skills
  - keep up with readings
  - classroom participation
- Outcomes
  - Practical familiarity with range of text analysis technologies
  - Understanding of theoretical models underlying these tools
  - Competence in reading research literature

# ASSESSMENT: ASSIGNMENTS AND EXAM

- Homework (20% total = 4 × 5% each)
  - Small activities building on workshop
  - Released every 2-3 weeks, due the following week
- Project (30% total)
  - Individual work
  - Released after Easter & due near end of semester
- Exam (50%)
  - two hour, closed book
  - covers content from lectures, workshop **and prescribed reading**
- **Hurdle** >50% exam, and >50% on homework + project

# TEACHING STAFF

- Lecturers
  - Daniel Beck



Trevor Cohn

- Teaching Assistants

Ekaterina
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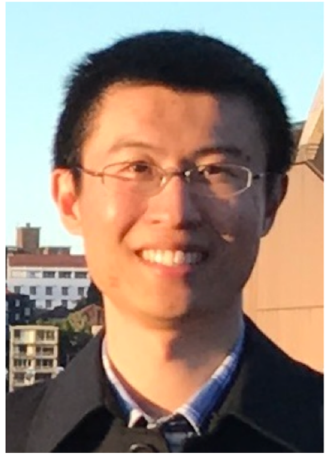

Yuan Li

# COURSE OVERVIEW

## Introduction to text processing

- Text classification, word meaning and document representations

## Structure learning

- Sequence tagging, n-gram language modelling, parsing & translation

## Information Retrieval

- Vector space model, efficient indexing, query expansion and using the web as a graph

## Larger tasks in Text Analysis

- Information extraction, question answering

# RECOMMENDED TEXTS

- Use a mixture of texts, mainly:
  - *Daniel Jurafsky and James H. Martin*, Speech and Language Processing, 2nd & 3rd eds., Prentice Hall. 2009 (out of print) & 2018 draft (free online).
- And dip into other texts, including:
  - *Manning et al*, 2008, Information Retrieval (free online)
  - *Koehn*, 2009, Machine Translation (library ebook)
- Recommended for learning python:
  - *Steven Bird, Ewan Klein and Edward Loper*, Natural Language Processing with Python, O'Reilly, 2009. (free online)
- Reading links or PDFs will be posted to website/LMS

# CONTACT HOURS

- Lectures
  - Tue 4:15-5:15pm Redmond Barry-200 (Rivett Theatre)
  - Wed 3:15-4:15pm Redmond Barry-101 (Lyle Theatre)
- Workshops: several on Mon/Tue/Wed/Fri
- Office hour, casual drop in session
  - Bring any questions you have to Daniel / Trevor
  - Wednesday 11am-noon Doug McDonell 7.02

# PYTHON

- Making extensive use of python
  - workshops feature programming challenges
  - provided as interactive ‘notebooks’ for workshops
  - homework and project in python
- Using several great python libraries
  - NLTK (text processing)
  - Numpy, Scipy, Matplotlib (maths, plotting)
  - Scikit-Learn (machine learning tools)

# PYTHON

- Python '*Canopy EPD*' installed on workshop machines
  - Can use this at home (free download, but register with your unimelb email)
  - Based on Python 2.7
- New to Python?
  - Expected to pick this up during the subject, on your own time
  - Learning resources on the LMS

# WHY PROCESS TEXT?

- Masses of information ‘trapped’ in unstructured text
  - How can we find this information?
  - Let computers automatically reason over this data?
  - First need to understand the structure, find important elements and relations, etc…
  - Over 1000s of languages….
- Challenges
  - Search, displaying results
  - Information extraction
  - Translation
  - Question answering
  - …

# A MOTIVATING APPLICATION

- IBM ‘Watson’ system for Question Answering
  - QA over large text collections
    - Incorporating speech recognition, speech synthesis and more
  - https://www.youtube.com/watch?v=FC3IryWr4c8
  - https://www.youtube.com/watch?v=lI-M7O_bRNg (from 3:30-4:30)
- Research behind Watson is *not* revolutionary
  - But this is a transformative result in the history of AI
  - Combines cutting-edge text processing components with large text collections and high performance computing