

School of Computing and Information Systems  
The University of Melbourne  
COMP90042 NATURAL LANGUAGE PROCESSING (Semester 1, 2021)

Workshop exercises: Week 10

### Discussion

1. What aspects of human language make automatic translation difficult?
2. What is **Information Extraction**? What might the “extracted” information look like?
  - (a) What is **Named Entity Recognition** and why is it difficult? What might make it more difficult for persons rather than places, and *vice versa*?
  - (b) What is the **IOB** trick, in a sequence labelling context? Why is it important?
  - (c) What is **Relation Extraction**? How is it similar to NER, and how is it different?
  - (d) Why are hand-written patterns generally inadequate for IE, and what other approaches can we take?

### Programming

1. In the iPython notebook `11-machine-translation`, we provide an example of an encoder-decoder model for machine translation. Just like workshop-07, we’ll use colab to run the notebook, as we’ll need a GPU to speed up the training. Please refer to workshop-07 if you are looking for instructions to get set up for colab.
  - Modify the code to use GRU instead of LSTM, noting that GRU does not have a memory state (`state_c`).
  - Modify the code to do translation at the word-level instead of character-level. This will involve:
    - Using a French and English tokeniser (e.g. `spaCy`);
    - Creating a vocabulary for the input source and target language;
    - Replacing low frequency words with a special UNK token;
    - Changing the corpus reading function to create sequences of words for the training data;
    - Updating the training model and inference model to use the word vocabulary to look up words.

### Get ahead

- Extend the encoder-decoder model in `11-machine-translation` to incorporate attention mechanism. You can use the formulation described in the lecture: dot product for comparing encoder and decoder hidden states; and concatenating the “context vector” with the decoder hidden state to predict the target word.