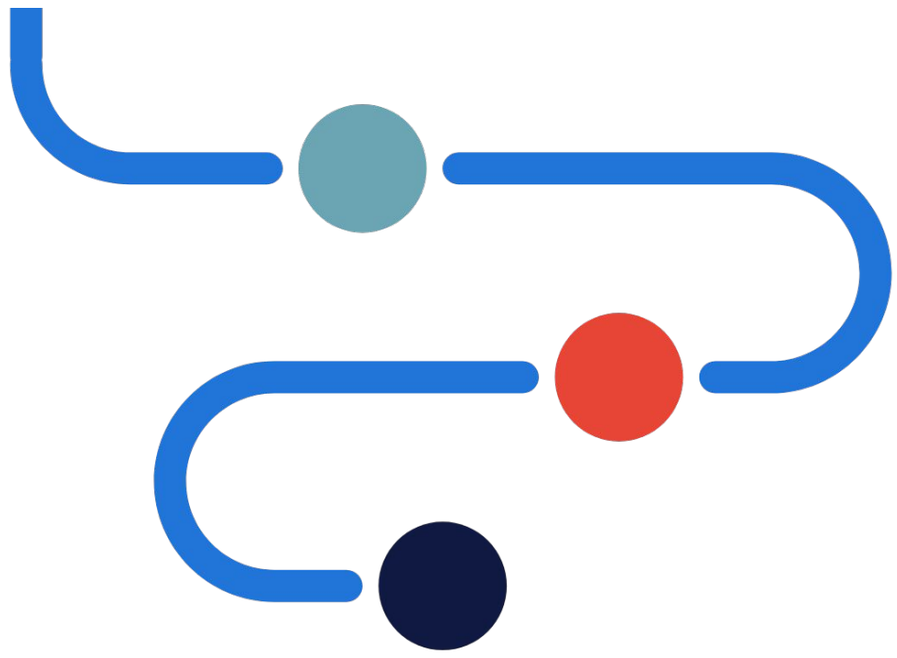
Research Report Structure

F21RP - Research Methods and Project Planning

Research Process

- Realise that there is a problem
- Find out whether anyone has solved it
- Develop a plan to solve it
- Solve it !
- Evaluate your solution
- Disseminate your solution



Research Report: Table of Contents

1. An Abstract (about 200 words)

2. An Introduction chapter (motivations, goals)

3. A Literature Review chapter as agreed with your supervisor

4. Requirements Analysis (aims, objectives, project/system requirements)

5. (If Applicable) Methodology: some preliminary ideas of the final system, or model to be implemented, or outline of the steps of survey

6. Professional, Legal, Ethical, and Social issues

7. Project Plan (tasks, timeline, Gantt chart, and Risk Analysis)

Abstract

- General outline of the field of research
- What is the gap missing currently
- What you propose to do that will fill this gap
  - Level of detail varies depending on how much you have thought of the final implementation
- How you will evaluate your proposed method
- Expected results / impact

Linguistically-Informed Self-Attention for Semantic Role Labeling

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Abstract

Outline Gap Current state-of-the-art semantic role labeling (SRL) uses a deep neural network with no explicit linguistic features. However, prior work has shown that gold syntax trees can dramatically improve SRL decoding, suggesting the possibility of increased accuracy from explicit modeling of syntax. In this work, we present linguistically-informed self-attention Proposal (LISA): a neural network model that combines multi-head self-attention with multi-task learning across dependency parsing, part-of-speech tagging, predicate detection and SRL. Unlike previous models which require significant pre-processing to prepare linguistic features, LISA can incorporate syntax using merely raw tokens as input, encoding the sequence only once to simultaneously perform parsing, predicate detection and role labeling for all predicates. Syntax is incorporated by training one attention head to attend to syntactic parents for each token. Moreover, if a high-quality syntactic parse is already available, it can be beneficially injected at test time without re-training our SRL model. Evaluation In experiments on CoNLL-2005 SRL, LISA achieves new state-of-the-art performance for a model using predicted predicates and standard word embeddings, attaining 2.5 F1 absolute higher than the previous state-of-the-art on newswire and more than 3.5 F1 on out-of-domain data, nearly 10% reduction in error. Results On ConLL-2012 English SRL we also show an improvement of more than 2.5 F1. LISA also out-performs the state-of-the-art with contextually-encoded (ELMo) word representations, by nearly 1.0 F1 on news and

shown to improve results in challenging downstream tasks such as dialog systems (Tur et al., 2005; Chen et al., 2013), machine reading (Berant et al., 2014; Wang et al., 2015) and translation (Liu and Gildea, 2010; Bazrafshan and Gildea, 2013).

Though syntax was long considered an obvious prerequisite for SRL systems (Levin, 1993; Punyakanok et al., 2008), recently deep neural network architectures have surpassed syntactically-informed models (Zhou and Xu, 2015; Marcheggiani et al., 2017; He et al., 2017; Tan et al., 2018; He et al., 2018), achieving state-of-the art SRL performance with no explicit modeling of syntax. An additional benefit of these end-to-end models is that they require just raw tokens and (usually) detected predicates as input, whereas richer linguistic features typically require extraction by an auxiliary pipeline of models.

Still, recent work (Roth and Lapata, 2016; He et al., 2017; Marcheggiani and Titov, 2017) indicates that neural network models could see even higher accuracy gains by leveraging syntactic information rather than ignoring it. He et al. (2017) indicate that many of the errors made by a syntax-free neural network on SRL are tied to certain syntactic confusions such as prepositional phrase attachment, and show that while constrained inference using a relatively low-accuracy predicted parse can provide small improvements in SRL accuracy, providing a gold-quality parse leads to substantial gains. Marcheggiani and Titov (2017) incorporate syntax from a high-quality parser (Kiperwasser and Goldberg, 2016) using graph

Introduction

- GOAL of your project + main thesis (and hypotheses)
- Motivation (why is it interesting?)
- Important previous work on your problem (briefly, how do you differ?)
- Evaluation method (how do you plan to support your thesis/prove-disprove hypotheses: research questions)
- Expected results / impact
- … give concrete examples using illustrations!

Literature Review

- You should write a 15 to 20 page chapter, based on a literature survey.
- The literature survey should:
  - introduce the topic and explain its significance (Background)
  - discuss relevant literature for each of the main ideas in the topic (Related Work)
  - summarise the literature to make a critical assessment of the topic
  - make recommendations for further research activity (Future Work)
  - Connect every piece of literature/related work with proposed project
- Your Research Report should also:
  - be based on at least 10 references;
  - have at least 50% published sources e.g. books, papers from scientific journals, papers from conference/workshop proceedings, magazines;
  - careful with arXiv
  - avoid unattributed Internet sources, especially Wikipedia

Referencing: Harvard Style

- Recommended citation and referencing style is Harvard
  - (Author(s), Date), e.g., (Knuth, 1968)
  - Alphabetical list of references
- You must use this style or else agree a different style with your project supervisor

Requirements Analysis (All Projects)

- This chapter contains Project Requirements
- **Identify** stakeholders, aims and objectives
- Distinguish **mandatory** from **optional** requirements
  - Must Have, Should Have, Could Have, Won't have
- **Outline** your **system architecture / model / survey pipeline, or process**
- Distinguish **functional** (components/tasks of the project) from **non-functional** (operational characteristics) **requirements**.
  - E.g., for a research-based project
  - **Functional**: Build/Train baseline model, fine-tune pre-study questionnaire,etc.
  - **Non-Functional**: model should run in <2hrs per epoch, use MS Forms and enforce anonymisation, etc.

Requirements Analysis (Implementation Projects)

- This chapter contains concrete System Requirements Analysis

- Additionally:

  - Distinguish functional (processes of the system) from non-functional (operational characteristics) requirements, for example:

    - Functional: the app must be able to receive notifications, the client must support RSA encryption

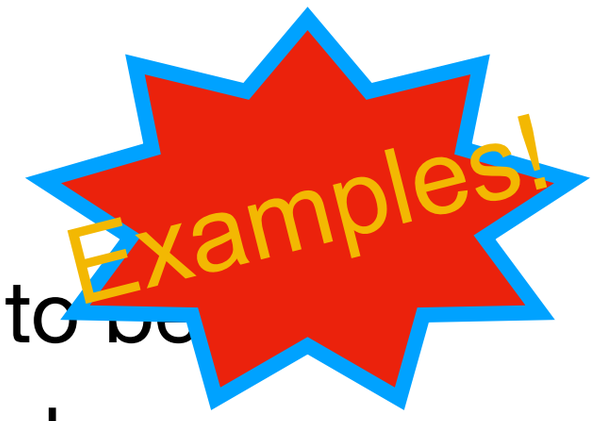
    - Non-Functional: the app should run on Android OS, the server must at least run on Linux OS

  - Possibly include a user model (case study) of the system

Methodology

- Applicable to most projects, especially research-based:
  - Data Science, Machine Learning, Artificial Intelligence, HRI

- Datasets to be used (if applicable)

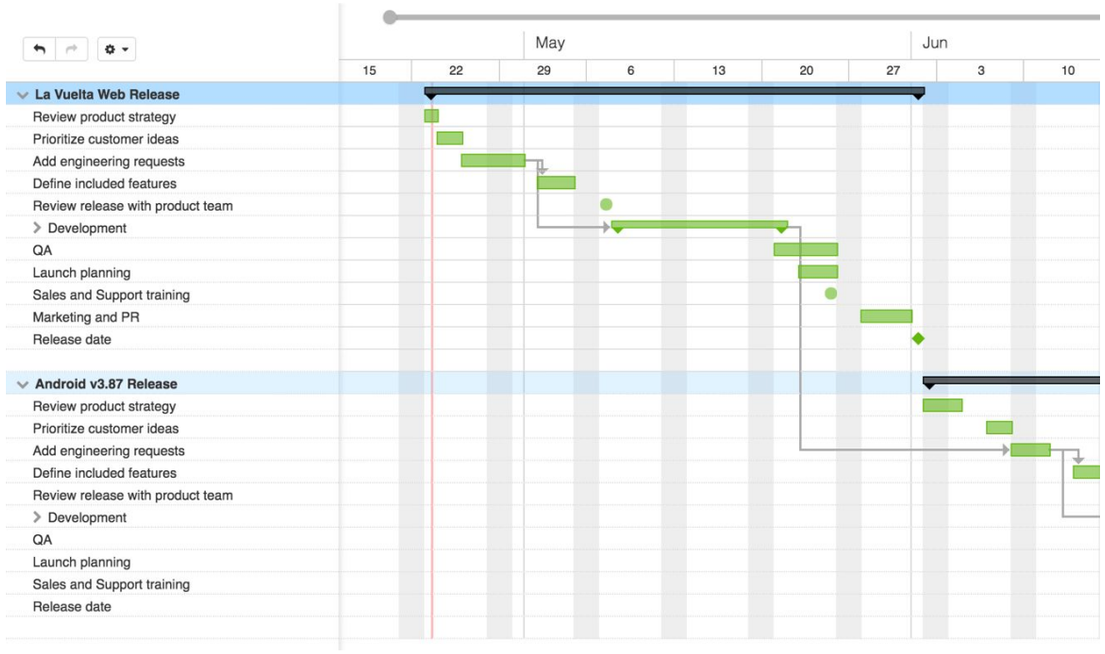


- Preliminary ideas of model or system to be implemented; existing baselines to extend

- Experimental setup and evaluation protocol

Project Plan

- Steps to disseminate the project
  - Gantt Chart
  - Meaningful granularity
  - Don’t leave long processes until the end
  - Don’t leave evaluation until the end
- Risk Analysis



The “Document”

- Probable total length: ~30 (max 40) pages

- Quality is far more important than length!

- Do not copy and paste from any source without attribution – you will fail this course!

Template on Overleaf

- Overleaf: Free online Latex editor

- http://www.overleaf.com/latex/templates/heriot-watt-university-hwu-cs-masters-thesis-template/nnyccpsbqrcj

- Latex tutorial: https://www.overleaf.com/tutorial

- Recommended for your Research Report and MSc Dissertation

- …or use any text editor like Word

Plagiarism

- Your Research Report must:
  - be all your own work. While you are likely to discuss your work with other people, you must explicitly acknowledge anyone that helps you;
  - have full citations and references that will enable a reader to find the sources;
  - use proper quoting conventions to identify where you have used other peoples' writing.
- You will be penalised if you do not follow these requirements.
- Your Report will be checked for plagiarism using software (e.g., Turnitin)

Who will mark my report?

- Your supervisor
  +1 other member of CS staff
- Official Marking Rubric
  - CANVAS

Examples

- Research Reports
  - CANVAS
- MSc Thesis
  - CANVAS

Ethics Form

- Online form through MSc projects system
- Use of Human Subjects
  - Experimental Task (deception, i.e., WoZ, special equipment)
  - Consent Forms (submit signed consent forms to online repository : Link TBC, or hand in physical signed copies to MACS office)
- Use of Datasets, Socia media data (e.g., X/Twitter, Meta/Facebook, Instagram, Tiktok, etc.
- Risk Assessment (Healthy and Safety)
- GDPR compliant
- Process:
  - Students submits form
  - Supervisor approves form
  - Ethics Coordinator approves form

Participant ID: _____ Site: _____ Date: ___/___/___

System Usability Scale

Instructions: For each of the following statements, mark one box that best describes your reactions to the website *today*.

		Strongly Disagree				Strongly Agree
1.	I think that I would like to use this website frequently.	☐	☐	☐	☐	☐
2.	I found this website unnecessarily complex.	☐	☐	☐	☐	☐
3.	I thought this website was easy to use.	☐	☐	☐	☐	☐
4.	I think that I would need assistance to be able to use this website.	☐	☐	☐	☐	☐
5.	I found the various functions in this website were well integrated.	☐	☐	☐	☐	☐
6.	I thought there was too much inconsistency in this website.	☐	☐	☐	☐	☐
7.	I would imagine that most people would learn to use this website very quickly.	☐	☐	☐	☐	☐
8.	I found this website very cumbersome/awkward to use.	☐	☐	☐	☐	☐
9.	I felt very confident using this website.	☐	☐	☐	☐	☐
10.	I needed to learn a lot of things before I could get going with this website.	☐	☐	☐	☐	☐

Please provide any comments about this website:

Attributions (1/2)

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Attributions (2/2)

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