# David Ralph

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### Personal Statement

Hardworking, proactive, fast learner, with a keen interest in cognitive computing, data science, and machine learning. I seek high quality, practical solutions and enjoy creative problem solving and overcoming challenges. I have strong linguistic skills and can communicate complex ideas clearly and concisely, including to non-technical people. My key motivation is working on responsible, beneficial, and effective applications of AI. My primary aims are to become more practiced and knowledgeable in my field and to make meaningful contributions.

## University of Southampton (2017 – 2022)

PhD Computer Science

- Search & Recommendation Systems
- Natural Language Processing
- Neural Language Models
- Applied Machine Learning
- Deep Learning
- Data Visualisation
- Data Provenance
- Cold-Starts

### Thesis Topic

Insights from Heterogeneous Data Through Transitive Semantic Relationships and Text Analytics

How can machine understanding of text be used to produce insights from large collections of unstructured text to inform decision makers, analysts, and organisations? My research couples semantic understanding of text through deep learning with explainable downstream algorithms for recommendation, visualisation, summarisation, clustering, and topic naming, to produce explainable insights and representative overviews of large unstructured text datasets, making previously indigestible datasets open to analysis by aiding in the presentation and organisation of unstructured text data.

### Publications & Impact

Recommendations from Cold Starts in Big Data (Extended Edition)

Published & Peer-Reviewed, Springer Computing 2020, DOI 10.1007/s00607-020-00792-y

Introduces Transitive Semantic Relationships (TSR), a new technique for ranking recommendations from cold-starts in datasets with very sparse, partial labelling, by making use of semantic embeddings of item descriptions. Also introduces a new dataset on the Isle of Wight supply chain. TSR has applications in inferring additional relationships in partially labelled datasets, highlighting potential items of interest for human review, and for use as a recommendation algorithm, either standalone or supporting traditional recommender systems in difficult cold-start situations.

Recommendations from Cold Starts in Big Data

Published, Peer-Reviewed and Presented, 4th International Conference on Internet of Things, Big Data and Security
DOI 10.5220/0007798801850194

COVID-19 Areas of Research Interest

My research assisted the UK Parliamentary Office of Science and Technology (POST) with identifying the key concerns of experts regarding the COVID-19 pandemic in the United Kingdom, used to inform POST's ARIs. Publication pending.

## University of Portsmouth (2013 – 2017)

MEng Computer Science – 1st Class Master's Degree

- Computer Security
- Web Server Programming
- Computer Graphics & Vision
- Neural Networks & Genetic Algorithms
- Distributed & Parallel Systems
- Software Engineering
- Computer Networks
- Database Systems

### Dissertation Project

Augmented Reality Asbestos Surveying

Worked with Hampshire Scientific Services to create an augmented reality mobile app for inspection and recording of asbestos locations. Developed for Android using the Wikitude Augmented Reality SDK. Presented at university's student conference 2016.

## Employment

### NLP Scientist, Habitat Learn LTD (2019 – To Date)

Applied research on Natural Language Processing systems to assist students with disabilities. Science lead on several Innovate UK research projects (1 completed, 3 ongoing). Research areas include **Semantic Search**, **Text Classification**, **Text Summarisation**, **Named Entity Recognition**, **Recommender Systems**, **Data Visualisation**.

### AI Engineer, Head of Research at Launch International LTD (2017 – 2019)

Lead developer of Launch Find Engine. Ongoing part-time advisory and software engineering role focused on data analysis and AI / **Machine Learning** tooling and applications. Annual placements as part of PhD candidature.

### Full-Stack Developer at KnowNow Information (2016 – 2017)

Developed a client project with KnowNow Information. Responsible for creating the **REST API services**, **databases**, web scraping and **Data Mining** tools, and CMS, as well as design, planning, and testing of all areas of the project. Additionally, made major extensions to the main user interface (using **Google Polymer**), and regularly liaised with the client. Elements of the API and web scraper utilise **Open Data**, **Linked Data**, and **IBM Watson** Cognitive Services. The project is hosted on the **IBM Cloud** platform for which I managed environment and service setup.

## Skills

*** Bold** indicates industry experience

| | |
|---|---|
| AI & Data Science | **Machine Learning**, **Deep Learning, Data Mining**, **Data Visualisation, Semantic Search**, **Text Classification**, **Text Summarisation**, **Named Entity Recognition**, **Recommender Systems** |
| Programming | **Python,** Java, Haskell, Object Oriented Programming, Functional Programming |
| Web Programming | **JavaScript (ES6), HTML**, **CSS**, **Node.JS**, **Express**, **REST APIs**, **OAuth**, **Mocha (unit testing)**, **Flask**, **Polymer**, PHP, Java EE |
| Databases | **Document databases, MongoDB**, **Mongoose**, GridFS, Relational databases, MySQL |
| Misc. | **Version Control (Git)**, **Issue Tracking (GitHub)**, **Cloud Computing (AWS and IBM Cloud)** |

## Other Experience

### Volunteer Senior Committee Member for Hack Pompey (2015 – To Date)

Planning, organising, and running the largest annual hackathon on the South Coast. Hack Pompey is an event where people from all backgrounds and disciplines join together to learn, work together, and realise creative projects and ideas. I have helped organise five events including some with over 100 attendees, with themes including sustainability, smart homes, and wearable tech. I built and maintain the Hack Pompey website: hackpompey.co.uk.

### VP Tech for University of Portsmouth IT Society (2015 – 2017)

Organised and ran student workshops on Web technologies (HTML5, CSS, JavaScript), Version control (Git), and Python Game Development. • Provided 1-to-1 support to students for programming, version control (Git), maths, and logic. • Arranged talks and extra-curricular lectures from university staff and industry guests.

| **Events, Competitions & Awards** | **Team** | **Award** |
|---|---|---|
| Hack Junction 2017 | Les Fibe | Most Creative Use of the Spotify Platform |
| NASA Space Apps 2017 – IBM Hursley | Les Fibe | Winning Team (Regional) |
| Pub Hack Portsmouth 2016 | Les Fibe | Best use of technology |
| Hack Pompy 4, 6, 7, 8, & 9 | (Event Organiser) | |

## Projects

Demos of many of my academic and hobby projects can be found at davidralph.github.io/portfolio
The source code for most can be found on public repositories at github.com/DavidRalph

## Interests

I enjoy reading and keep up with various topics in other sciences, particularly quantum physics, astrophysics, and cosmology. Other interests include ancient and classical history, engineering, and science fiction.