

# Ghadah Alghamdi

PHD IN ARTIFICIAL INTELLIGENCE - COMPUTER SCIENCE ·

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*“Be the change that you want to see in the world.”*

## Summary

I am a full-time Assistant Professor in the Computer Science Department at Dar Al-Hekma University. During the Fall semester of the 2024–2025 academic year, I also served as the head of the Faculty Development Unit. I received my PhD and MSc degrees from the University of Manchester. My master's thesis and doctoral dissertations both dealt with applications of description logic-based ontologies in the field of artificial intelligence. Prior to earning my graduate degrees (PhD and MSc), I worked as an ERP system administrator at one of the major companies in Jeddah, Saudi Arabia. I'm ambitious and willing to pick up new skills quickly in computer science and information technology if the need arises.

## Education

### The University of Manchester

Manchester, UK

PHD IN ARTIFICIAL INTELLIGENCE - COMPUTER SCIENCE

Sep 2017 - Jul 2022

- My thesis project targeted the Systemized Nomenclature of Medicine – Clinical Terms (SNOMED CT) ontology, among others, which is widely used in the (bio-)medical domain, as it provides a comprehensive multilingual vocabulary for capturing all aspects of electronic health records and clinical knowledge. SNOMED CT is very large and complex ontology. Ontology extraction methods enable efficient use of such large ontologies by splitting them into interconnected smaller parts. My thesis presents a novel method for extracting focus set subontologies from the source ontologies for a set of symbols selected by the user. The resulting subontologies satisfy the requirements sought by SNOMED CT users, including providing complete semantics for the description of input symbols while being concise and conforming to SNOMED CT modelling principles. The findings show that, in comparison to locality-based modularisation and uniform interpolation, the resulting subontologies satisfy the requirements of SNOMED CT in terms of size, encapsulating the entire semantics of the definitions solely for the set of input symbols, and retaining the original ontology's structure. My thesis also investigates the computation of semantic differences between extracted subontologies using a combination of our notion of subontologies and the uniform interpolation-based semantic difference method in order to constrain the development of such differences to a particular subdomain of the ontology identified by the user. The findings demonstrate that our method is capable of revealing differences in the meaning of focus concept definitions associated with a particular subdomain of the ontology, where some of these differences would not have been generated without this focused approach to tracking semantic differences between ontologies.

### The University of Manchester

Manchester, UK

MSC IN ADVANCED COMPUTER SCIENCE

Sep 2015 - Nov 2016

- During the postgraduate taught year, I have developed a web-based tool that exploits LETHE functionalities, which are uniform interpolation and logical differences. The back-end of the tool consists of the LETHE library, OWL API and webVOWL. LETHE library provides implementation for uniform interpolation and forgetting, which aim to produce restricted-view ontologies. The production of these views is conducted on the basis of the desired signature. This signature can be class or object property symbols that belong to a certain ontology.
- LETHE provides implementation for two other applications of uniform interpolation, which are logical differences and TBox abduction. The logical differences of two ontologies are axioms that are entailed by the second ontology and not by the first one. This is conducted by computing the uniform interplant of a signature  $S$ , which can be common (shared) between the two ontologies or a specific set of signatures. This set of signatures is not entailed by the first ontology. Logical differences application is useful in tracking the changes between the versions of ontologies. The other application of uniform interpolation is TBox abduction, which adds a set of axioms to a certain ontology by establishing that these axioms are logically entailed by the ontology.
- The browser is also supported with visualisation features. These features are provided by webVOWL, which is a web-based tool that visualises ontologies. WebVOWL and LETHE-web analyser were integrated to enable visualisation for the resulting ontologies computed by the latter tool. The browser targets ontology expert users and non-expert ones for many uses. Expert users can utilise the tool for ontology analysis, debugging and reuse. On the other hand, non-expert users can use the tool for browsing smaller views of ontologies; the tool allows them to understand the entities and concepts of the ontologies.

### King Abdulaziz University

Jeddah, KSA

B.S. IN INFORMATION TECHNOLOGY

Nov 2008 - Dec 2013

- Graduation project: the project purpose is to provide a tool that helps visually impaired and blind people. The tool will capture images of readable text from books or magazines. The capturing process is done using mobile camera. In addition, the user can choose an existing image from the mobile gallery. Then, the tool will convert it to digital text and read it aloud. Moreover, the tool will translate the text with a built-in translator, which will help the user to understand any language.

## Work Experience

### Dar Al-Hekma University

Jeddah, Saudia Arabia

ASSISTANT PROFESSOR

Jan 2023 - Present

- I am a full time Assistant Professor in the Computer Science Department at the school of Engineering, Computing and Design.

### Dar Al-Hekma University

Jeddah, Saudia Arabia

ASSISTANT PROFESSOR

Nov 2022 - Dec 2022

- I was recruited in the middle of Fall semester 22-23 as a Part-Time Assistant Professor at the General Education department, where I taught two subjects; "Introduction to Artificial Intelligence" and "Information and Communication Technology". Duration: two months.

### The University of Manchester

Manchester, UK

TEACHING ASSISTANT

Jan 2018 - Mar 2018, Oct 2020 - Dec 2020

- I have taught the module: COMP00900 Foundation Year Project in the second semester of the academic year 2017/2018. In this module, students work on their foundation year project. The project consists of applying their skills they acquired during the course duration in Latex, HTML, and other markup languages including RTF and XML.
- I also taught COMP16321 Introduction to Programming 1 in the first semester of the academic year 2020/2021. In this module, students learn about the fundamental concepts for becoming a competent programmer. It explores the basic concepts behind imperative computer programming.

### SAB Holding Company (SAB Innovation)

Jeddah, KSA

ERP SECURITY CONSULTANT

Apr 2017 - Jun 2017

- Before leaving the company to accept my PhD scholarship, I received intense training for my role as an ERP Security Consultant.
- The training involved working on the [SAP ERP](#) system of the company. The training was to acquire knowledge about being an ERP Security consultant and to deal with the different SAP system's components such as Finance and Accounting, HR, Procurement and Contracts.

### Modern Times Technical Systems Company (MTTS)

Jeddah, KSA

INFORMATION SYSTEM ADMINISTRATOR

May 2014 - Feb 2015

- My role at MTTS involved working on the Microsoft Dynamics AX ERP System. My main responsibilities were ERP development, testing and providing user support.
- My experience focused on the following areas:
  - . Creating customized modules.
  - . MorphX Reports.
  - . Microsoft SQL Server Reporting Services (SSRS)
  - . Security Framework.
  - . RunBase Framework.
  - . Batch Based Notifications.
  - . Workflows.

## Major Projects & Publications

### The University of Manchester & SNOMED International

Manchester, UK

(1) FOCUS SET SUBONTOLOGY & SEMANTIC DIFFERENCE EXTRACTION

Feb 2020 - Dec 2023

As a continuation of our collaboration with [SNOMED International](#) on extracting focused extracts for their subsets (see Project (3)), I devised a novel method for generating focus set subontologies in this research. The resulting subontologies are more beneficial and relevant to SNOMED International. The following publications arose from the project:

1. Ghadah Alghamdi, Renate A. Schmidt, Warren Del-Pinto, and Yongsheng Gao. **Upwardly Abstracted Definition-Based Subontologies.** In *Proceedings of the 34th International Workshop on Description Logics (DL 2021) part of Bratislava Knowledge September (BAKS 2021), Bratislava, Slovakia, September 19th to 22nd, 2021*, volume 2954 of CEUR Workshop Proceedings. CEUR-WS.org, 2021.
2. Ghadah Alghamdi, Renate A. Schmidt, Warren Del-Pinto, and Yongsheng Gao. **Upwardly Abstracted Definition-Based Subontologies.** In *K-CAP'21: Knowledge Capture Conference*, pages 209–216. ACM, 2021.
3. Warren Del-Pinto, Renate A. Schmidt, Yongsheng Gao, Ghadah Alghamdi, Alejandro Lopez Osornio, and Suzy Roy. **International Patient Summary Terminology** In *MEDINFO 2023 - The Future Is Accessible - Proceedings of the 19th World Congress on Medical and Health Informatics, Sydney, NSW, Australia, 8-12 July 2023* pages 63–67. IOS Press, 2023.
4. Ghadah Alghamdi, Renate A. Schmidt, and Yongsheng Gao. **Focus Set Semantic Differences** In *K-CAP'23: Knowledge Capture Conference*, pages 250–258. ACM, 2023.

The work [1] includes our initial results of the work in [2]

(2) TRACKING LOGICAL DIFFERENCE BETWEEN  $\mathcal{ELH}$  ONTOLOGIES

As a continuation of the project that started with [Babylon Health](#) (see Project (4)), we collaborated with Nanjing University on the development of a tool for tracking semantic differences across versions of  $\mathcal{ELH}$  ontologies. I conducted the experiments of generating focused semantic differences related to a standard subset of SNOMED CT, wrote the results and provided overall feedback on the work.

3. Zhao Liu, Chang Lu, Ghadah Alghamdi, Renate A. Schmidt, and Yizheng Zhao. **Tracking Semantic Evolutionary Changes in Large-Scale Ontological Knowledge Bases.** In *CIKM'21: The 30th ACM International Conference on Information and Knowledge Management, Virtual Event, Queensland, Australia, November 1 - 5, 2021*, pages 1130-1139, ACM, 2021.
4. Zhao Liu, Chang Lu, Ghadah Alghamdi, Renate A. Schmidt, and Yizheng Zhao. **Tracking Semantic Evolutionary Changes in Large-Scale Ontological Knowledge Bases.** In *Proceedings of the 34th International Workshop on Description Logics (DL 2021) part of Bratislava Knowledge September (BAKS 2021), Bratislava, Slovakia, September 19th to 22nd, 2021, volume 2954 of CEUR Workshop Proceedings.* CEUR-WS.org, 2021.

The work [4] is a short version of the work [3].

## (3) ONTOLOGY MODULARITY AND FORGETTING

In this project, we worked closely with [SNOMED International](#) and proposed a workflow of computing smaller ontology extracts based on ontology modularity and forgetting from SNOMED CT. To extract such extracts, we used a core subset of the SNOMED CT medical ontology, which was part of a quality improvement project at SNOMED International. The following publications arose from the project:

5. Jieying Chen, Ghadah Alghamdi, Renate A. Schmidt, Dirk Walther, and Yongsheng Gao. **Modularity Meets Forgetting: A Case Study with the SNOMED CT Ontology.** In *Proceedings of the 32nd International Workshop on Description Logics*, volume 2373. CEUR-WS.org, 2019.
6. Jieying Chen, Ghadah Alghamdi, Renate A. Schmidt, Dirk Walther, and Yongsheng Gao. **Ontology Extraction for Large Ontologies via Modularity and Forgetting.** In *Proceedings of the 10th International Conference on Knowledge Capture, K-CAP'19*, pages 45–52. ACM, 2019.

The work [5] includes our initial results of the work in [6].

## (4) LOGICAL DIFFERENCE CASE STUDY PROJECT

I was in a project that involved collaborating with [Babylon Health](#) to a case study that sought to find differences that might exist between several SNOMED CT ontology versions. For Babylon Health, detecting these differences was an important issue to make certain that integrating new information from SNOMED CT to their knowledge base is done in a safe manner by analysing the logical differences if they exist. The project resulted in the following publications:

7. Giorgos Stoilos, David Geleta, Szymon Wartak, Sheldon Hall, Mohammad Khodadadi, Yizheng Zhao, Ghadah Alghamdi, and Renate A. Schmidt. **Methods and Metrics for Knowledge Base Engineering and Integration.** In *Proceedings of the 9th Workshop on Ontology Design and Patterns (WOP 2018) co-located with 17th International Semantic Web Conference (ISWC 2018), Monterey, USA, October 9th, 2018*, volume 2195 of *CEUR Workshop Proceedings*, pages 72–86. CEUR-WS.org, 2018.
8. Yizheng Zhao, Ghadah Alghamdi, Renate A. Schmidt, Hao Feng, Giorgos Stoilos, Damir Juric, and Mohammad Khodadadi. **Tracking Logical Difference in Large-Scale Ontologies: A Forgetting-Based Approach.** In *The Thirty-Third AAAI Conference on Artificial Intelligence, AAAI 2019, The Thirty-First Innovative Applications of Artificial Intelligence Conference, IAAI 2019, The Ninth AAAI Symposium on Educational Advances in Artificial Intelligence, EAAI 2019, Honolulu, Hawaii, USA, January 27 - February 1, 2019*, pages 3116–3124. AAAI Press, 2019.
9. Yizheng Zhao, Ghadah Alghamdi, Renate A. Schmidt, Hao Feng, Giorgos Stoilos, Damir Juric, and Mohammad Khodadadi. **Tracking Logical Difference in Industrial-Scale Ontologies.** In *Proceedings of the 32nd International Workshop on Description Logics, Oslo, Norway, June 18-21, 2019*, volume 2373 of *CEUR Workshop Proceedings*. CEUR-WS.org, 2019.

The work [9] is an extended abstract of the work [8].

## Freelance Work

## (6) “LEARN ARABIC LETTERS” MOBILE APPLICATION

After I gained my Master degree from the University of Manchester, my friend, Bdour Alharbi, and I decided to develop “[Learn Arabic Letters](#)” iOS application. The application is targeting children of age 4 to 6. A child can learn how to write Arabic alphabet letters faster through the app. The process is done by tracking the drawing path of a certain letter. The application is available for iOS and Android devices (see github [page](#): <https://github.com/Bethrah/LAL>).

## Petro Rabigh

## (7) INVOICE INFORMATION WEB APPLICATION

As part of my internship at [Petro Rabigh](#), I developed a web application that get the invoice information from each employee and save it to the database, the result is a report that contains the invoice information.

## Recent Presentations

## The Twelfth International Conference on Knowledge Capture 2023 (K-CAP 23)

## The Eleventh International Conference on Knowledge Capture 2021 (K-CAP 21)

PAPER LONG PRESENTATION

Virtual conference

Dec 2021

## Description Logics 2021 Workshop at Bratislava, Slovakia

PAPER POSTER PRESENTATION

Online Event

Sep 2021

## Computer Science Research Symposium at The University of Manchester

PHD RESEARCH POSTER PRESENTATION

Manchester, UK

Apr 2019

## Other Experience

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### Rabigh Refining & Petrochemical Company

INTERNSHIP TRAINING (APPLICATION DEVELOPER)

Jeddah, KSA

Jun 2013 – Jul 2013

- I took courses about SAP ERP system, which is the enterprise application software that is used in the company.
- I Developed a web application that get the invoice information from each employee and save it to the database, the result is a report that contains the invoice information.

### The Society of Majid Bin Abdulaziz for Development and Social Services

VOLUNTEER (DATA ENTRY)

Jeddah, KSA

Jun 2012 – Jul 2012

I was responsible for entering data into the loan facilitator program.

### Google conference “g | saudi arabia”

VOLUNTEER (USHER)

Jeddah, KSA

Mar 2012

The “g | saudi arabia” 2.0 conference took place at Jeddah Chamber of Commerce and Industry. The event was about presenting and introducing people to the latest Google technologies such as, Android, Google nexus, ...etc. The event included workshops about Google Chrome extensions and many more. I was a member of the event's organising committee and an usher.

### SABB Bank

SUMMER TRAINING (CUSTOMER SERVICE)

Jeddah, KSA

Aug 2010

I had a one month summer training at the customer service department of SABB Bank.

## Different Courses

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2021	<b>SNOMED CT Implementation Course</b> , SNOMED International	Online course, UK
2020	<b>SNOMED CT Foundation Course</b> , SNOMED International	Online course, UK
2017	<b>Excellence in Customer Service</b> , Workshop from Ingeus for Human Development Company	Jeddah, KSA
2017	<b>Introduction to Labar Law</b> , Workshop from Ingeus for Human Development Company	Jeddah, KSA
2015	<b>General English - Proficiency Level 9</b> , Berlitz Language Centre	Manchester, UK
2014	<b>Business Ethics</b> , Workshop from Ingeus for Human Development Company	Jeddah, KSA
2014	<b>ASP.NET (C#) Programming</b> , Al-Alamiah Institute for Computer & Technology	Jeddah, KSA
2014	<b>C# Programming</b> , Al-Alamiah Institute for Computer & Technology	Jeddah, KSA
2014	<b>Self-Development Course</b> , Al-Alamiah Institute for Computer & Technology	Jeddah, KSA
2007	<b>English Language - Level 3</b> , Al-Khaleej Language Institute- Direct English	Jeddah, KSA
2005	<b>English Language - Level 2</b> , The Saudi Cultural Centre	Jeddah, KSA
2002	<b>English Language - Level 1</b> , The Saudi Cultural Centre	Jeddah, KSA

## Conferences

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2023	<b>The Twelfth International Conference on Knowledge Capture</b> , University of West Florida	<i>Pensacola, FLA, USA</i>
2021	<b>The Eleventh International Conference on Knowledge Capture</b> , Virtual Conference	<i>Online</i>
2021	<b>34th International Workshop on Description Logics</b> , Virtual Conference	<i>Online</i>
2019	<b>Computer Science Research Symposium</b> , The University of Manchester	<i>Manchester, UK</i>
2019	<b>JOWO 2019 - The Styrian Autumn of Ontology</b> , The Medical University of Graz	<i>Graz, Austria</i>
2013	<b>Robots Workshop</b> , The Institute of Electrical and Electronics Engineering (IEEE)	<i>Jeddah, KSA</i>
2013	<b>The 10th Annual Learning and Technology Conference (Cloudscaping: The Global Learning Environment)</b> , Effat University	<i>Jeddah, KSA</i>
2012	<b>Google conference: “g   saudi arabia”</b> , Four Seasons Hotel Riyadh	<i>Riyadh, KSA</i>
2012	<b>Tech Fun by Microsoft partners</b> , King Abdulaziz University	<i>Jeddah, KSA</i>
2011	<b>Cloud Computing</b> , King Abdulaziz University	<i>Jeddah, KSA</i>

## Computing Skills

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- Development/analysis of ontologies using [Protégé](#), and [OWL API](#).
- Employment of reasoning systems such as [ELK](#) and [Hermit](#) to develop and analyse ontologies.
- Able to use code version control services such as [GitHub](#), [Git](#) (from command line) and [GitLab](#).
- Front end web development using [HTML 5](#), [XML](#), [CSS 3](#) and [JavaScript](#).
- Back end web development using [Spring MVC](#).
- Developing blockchain-based applications using [Solidity](#).
- Database management on [Oracle](#).
- ERP administration on [Microsoft Dynamics AX 2009](#).
- Designing using [Adobe Photoshop](#) and [Adobe Illustrator](#).

## Human Skills

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- Working accurately with carefulness.
- Able to work with teams effectively.
- Able to adapt myself to new environments.
- Flexible and can fit to new conditions.
- Ambitious and have strong desire to achieve goals.
- Calm and can handle strict deadlines.