



# Chadi Helwe

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## Education

### Master of Science in Computer Science

2015-2017

AMERICAN UNIVERSITY OF BEIRUT

- GPA: 3.68/4
- Master's thesis: Arabic Named Entity Recognition via Deep Co-learning
- Recipient of the Best Computer Science Graduate Student Award

### Bachelor of Science in Computer Science

2010-2014

NOTRE DAME UNIVERSITY - LOUAIZE

- GPA: 3.63/4
- Senior project: Educaly - An Educational Social Network
- Graduated with high distinction

## Research Experience

### Retrieving Textual Evidence for Knowledge Graph Facts using Deep Learning

Nov. 2018 – Present

AMERICAN UNIVERSITY OF BEIRUT - IN COLLABORATION WITH AALBORG UNIVERSITY (DENMARK) AND HACETTEPE UNIVERSITY (TURKEY)

- Conducted research on deep learning for information retrieval
- Investigating transformer-based models trained with a dataset generated using distant supervision to rank passages based on their relevance to a given fact in the form of a Resource Description Framework (RDF) triple

### Automated Detection and Measurement of Corneal Haze and Demarcation Line in OCT Images

June. 2018 – Present

AMERICAN UNIVERSITY OF BEIRUT - IN COLLABORATION WITH THE DEPARTMENT OF OPHTHALMOLOGY (AMERICAN UNIVERSITY OF BEIRUT MEDICAL CENTER) AND THE ELZA INSTITUTE IN ZURICH (SWITZERLAND)

- Collaborating with ophthalmologists
- Redesigning an outdated software to detect and measure corneal haze and demarcation line in different types of Optical Coherence Tomography (OCT) images
- Adding new features and introducing deep learning to the software
- Developing *OCTAnalysis.com* a web interface of the software in Django/Python and Postgres SQL
- Preparing multiple papers to be submitted
- Proposed and implemented a semi-weakly supervised learning approach to segment the area between the top boundary of a cornea and the demarcation line in OCT images
- Developed a SegNet neural network to detect the boundaries of a cornea in OCT images
- Built a VGG-16 neural network to detect artifacts in OCT images
- Supervised two undergrad students who annotated a large dataset of OCT images
- Developed an image segmentation tool that is used for labeling
- Two papers were accepted for the *International CXL Experts Meeting 2019*

### Stock Price Prediction using Deep Learning

June 2018 – Apr. 2019

AMERICAN UNIVERSITY OF BEIRUT

- Developed different deep neural network architectures that predict the maximum stock price on a specific day by taking as inputs the stock price and news sentiment at each tick of the previous days
- Developed various trading strategies with a goal of maximizing profits based on the developed neural networks

### Predicting Arabic Blog Credibility using Deep Co-learning

Apr. 2018 – Apr. 2019

AMERICAN UNIVERSITY OF BEIRUT

- Implemented and evaluated a novel semi-supervised learning approach based on an algorithm called Co-training, which was adapted to the context of deep learning for the task of Arabic blog's credibility prediction and which can be trained using a small labeled dataset and a large unlabeled dataset
- Paper published in the *Proceedings of the 4<sup>th</sup> Arabic Natural Language Processing Workshop*

## ICD and CCS Coding using Deep Learning

Jul. 2016 – Nov. 2017

AMERICAN UNIVERSITY OF BEIRUT - IN COLLABORATION WITH THE DEPARTMENT OF EMERGENCY MEDICINE (AMERICAN UNIVERSITY OF BEIRUT MEDICAL CENTER)

- Conducted research on automatic coding of discharge diagnoses
- Collaborated with medical researchers from the American University of Beirut Medical Center
- Designed and implemented a deep neural network architecture to predict the International Classification of Diseases (ICD) code and Clinical Classifications Software (CCS) single level code of a discharge diagnosis
- Paper published in the *Proceedings of the 7<sup>th</sup> International Conference on Digital Health*

## Methodical Evaluation of Arabic Word Embeddings

Jan. 2017 – Feb. 2017

AMERICAN UNIVERSITY OF BEIRUT - IN COLLABORATION WITH QATAR UNIVERSITY

- Conducted research on word embeddings' evaluations
- Collaborated with Arabic linguists to design benchmarks
- Built the first word analogy benchmark designed specifically for Arabic word embeddings
- Implemented different Long Short-term Memory recurrent neural network architectures to evaluate Arabic word embeddings on two NLP tasks: Document Classification and Named Entity Recognition
- Paper published in the *Proceedings of the 55<sup>th</sup> Annual Meeting of the Association for Computational Linguistics*

## Adaptive QoS for Spark Applications

Jun. 2016 – Aug. 2016

AMERICAN UNIVERSITY OF BEIRUT

- Conducted research on adaptive Quality of Service (QoS)
- Developed an adaptive quality management/selection method for Spark applications
- Implemented different QoS policies in Java
- Paper published in the *Proceedings of the 7<sup>th</sup> International Conference on Cloud Computing and Services Science*

## Teaching Experience

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### Teaching Assistant

Feb. 2015 – May 2019

AMERICAN UNIVERSITY OF BEIRUT

- Introduction to Programming
- Artificial Intelligence
- Compiler Construction (graduate course)
- Machine Learning (graduate course)

### Teaching Assistant

Feb. 2013 – Jun. 2013

NOTRE DAME UNIVERSITY - LOUAIZE

- Program Design and Data Abstraction I
- Program Design and Data Abstraction II

## Work Experience

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### Software Engineer Intern

Aug. 2013 – Sep. 2013

SOFT SOLUTIONS

- Learned to program in Java, building on my C++ programming background
- Implemented a GUI calendar in Java with a reminder that uses MySQL as a back-end database

## Publications

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### Journal Papers

- [1] **Chadi Helwe** and Shady Elbassuoni, "Arabic Named Entity Recognition via Deep Co-learning", In: *Artificial Intelligence Review*, 52(1), 197-215, 2019

## Conference Papers

- [1] **Chadi Helwe**, Shady Elbassuoni, Mirabelle Geha, Eveline Hitti and Carla Makhoul Obermeyer, “CCS Coding of Discharge Diagnoses via Deep Neural Networks”, In: *Proceedings of the 7th International Conference on Digital Health (DH 2017)*, 175-179, London, United Kingdom, July 2017
- [2] Mohammed Elrazzaz, Shady Elbassuoni, Khaled Shaban and **Chadi Helwe**, “Methodical Evaluation of Arabic Word Embeddings”, In: *Proceedings of the 55th Annual Meeting of the Association for Computational Linguistics (ACL 2017)*, 454-458, Vancouver, Canada, August 2017
- [3] Bilal Abi Farraj, Wael Al Rahal Al Orabi, **Chadi Helwe**, Mohamad Jaber, Mohamad Omar Kayali, and Mohamed Nassar, “Reconfigurable and Adaptive Spark Applications”, In: *Proceedings of the 7th International Conference on Cloud Computing and Services Science (CLOSER 2017)*, 84-91, Porto, Portugal, April 2017

## Workshop and Abstract Papers

- [1] **Chadi Helwe**, Shady Elbassuoni, Ayman Al Zaatar and Wassim El-Hajj, “Assessing Arabic Weblog Credibility via Deep Co-learning”, In: *Proceedings of the 4th Arabic Natural Language Processing Workshop (WANLP@ACL 2019)*, 130-136, Florence, Italy, July 2019
- [2] Shady Awwad, Lily Chacra, **Chadi Helwe**, Ahmad Dhaini, Farhad Hafezi, Emilio Torres and Madeleine Yehia, “Accelerated Corneal Cross-linking Using 20 Minutes Riboflavin With Hydroxypropyl Methylcellulose Soaking Time Versus Conventional Cross-linking”, In: *Proceedings of the International CXL Experts Meeting 2019*, Zurich, Switzerland, December 2019
- [3] Shady Awwad, Lily Chacra, **Chadi Helwe**, Ahmad Dhaini, Farhad Hafezi, Emilio Torres and Talar Televizian, “Corneal Haze After Cross-linking for Keratoconus Eyes With and Without Mitomycin C Application”, In: *Proceedings of the International CXL Experts Meeting 2019*, Zurich, Switzerland, December 2019

## Conference Presentations

- [1] **Chadi Helwe**, Shady Elbassuoni, Mirabelle Geha, Eveline Hitti and Carla Makhoul Obermeyer, “CCS Coding of Discharge Diagnoses via Deep Neural Networks”, In: *Proceedings of the 7th International Conference on Digital Health (DH 2017)*, 175-179, London, United Kingdom, July 2017

## Submitted Papers

- [1] **Chadi Helwe**, Shady Elbassuoni, Ahmad Dhaini, Lily Chacra and Shady Awwad, “Detection of Demarcation Line in OCT Images using Semi-Weakly Supervised Learning”, Submitted to: *The International Conference on Medical Imaging with Deep Learning, (MIDL 2020)*

## Selected Projects

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### Arabic Named Entity Recognition via Deep Co-learning

MASTER'S THESIS

- Built a supervised deep learning model that infers the name entities' class in a Wikipedia article by classifying their Wikipedia pages into one of four classes: person, location, organization, or miscellaneous
- Generated a large dataset of partially annotated Wikipedia articles for the task of Arabic Named Entity Recognition (NER)
- Proposed a novel semi-supervised learning approach based on an algorithm called Co-training, which was adapted to the context of deep learning for the task of Arabic NER and which can be trained using a small fully annotated dataset and a large partially annotated dataset
- Evaluated our proposed approach, the Deep Co-learning algorithm, on three different Arabic NER datasets
- Paper published in *Artificial Intelligence Review*

### Educaly: An Educational Social Network

BACHELOR'S FINAL SENIOR PROJECT

- Educaly was a platform through which university and school students can share their knowledge using an easy and accessible interface
- Implemented using PHP and MySQL

### Detecting the Best Answers in Q/A Websites

MACHINE LEARNING COURSE

- Preprocessed the Yahoo! Answers dataset with various techniques, including stemming, stop words removal, and TF-IDF
- Experimented with different machine learning models learned during the course

### Compiler for the Parva Language

COMPILER CONSTRUCTION COURSE

- Investigated several parsing algorithms and tools to choose the best one for the compiler project
- Implemented a compiler for the Parva language using ANTLR

## Professional Activities

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- 2019 Reviewer for the IEEE Transactions on Neural Networks and Learning Systems
- 2019 Reviewer for the Artificial Intelligence Review
- 2019 Reviewer for the MADAR Shared Task - WANLP
- 2017 Reviewer for 5th International Conference on Big Data Analytics

## Awards and Scholarships

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- 2018 Recipient of the Best Computer Science Graduate Student Award from the American University of Beirut
- 2015 Awarded a full graduate assistantship from the American University of Beirut
- 2014 Graduated from Notre Dame University - Louaize with high distinction
- 2013 Awarded a scholarship from Notre Dame University - Louaize for having a cumulative GPA higher than 3.40/4
- 2013 Dean's List for the Spring semester
- 2012 Dean's List for the Spring and the Fall semesters

## Skills

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- Languages** Python, Java, C++, SQL
- Frameworks** Pytorch, Keras, Scikit-learn, NLTK, Django, Flask, SQLAlchemy
- Others** Microsoft Office, Latex

## Languages

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- French** Fluent
- English** Fluent
- Arabic** Mother Tongue

## Research Interests

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- Artificial Intelligence
- Machine Learning
- Natural Language Processing
- Computer Vision

## References

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**Available Upon Request**