



Chadi Helwe

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Education

Doctor of Philosophy in Artificial Intelligence

2021-Present

INSTITUT POLYTECHNIQUE DE PARIS

- Ph.D. thesis: Neuro-Symbolic Models for Logical Reasoning

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 (Rank class: In the top 3 out of 45 students)
- Senior project: Educaly - An Educational Social Network
- Graduated with high distinction

Research Experience

Neuro-Symbolic Models for Logical Reasoning

Jan. 2021 – Present

INSTITUT POLYTECHNIQUE DE PARIS

- Developing methods to combine symbolic and neural approaches for logical reasoning
- Investigating performance of transformers on different reasoning tasks
- Paper published in the *Proceedings of the 3rd Conference on Automated Knowledge Base Construction*

Retrieving Textual Evidence for Knowledge Graph Facts using Deep Learning

Nov. 2018 – Sep. 2020

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

- Conducted research on deep learning for information retrieval
- Investigated 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 – Sep. 2020

Images

AMERICAN UNIVERSITY OF BEIRUT - IN COLLABORATION WITH THE DEPARTMENT OF OPHTHALMOLOGY (AMERICAN UNIVERSITY OF BEIRUT

MEDICAL CENTER) AND THE ELZA INSTITUTE IN ZURICH (SWITZERLAND)

- Collaborated with ophthalmologists
- Redesigned an outdated software to detect and measure corneal haze and demarcation line in different types of Optical Coherence Tomography (OCT) images
- Added new features and introduced deep learning to the software
- Developed *OCTAnalysis.com* a web interface of the software in Django/Python and Postgres SQL
- 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 published for the *International CXL Experts Meeting 2019*
- Paper published in the *Proceedings of the 24th Annual Conference on Medical Image Understanding and Analysis*
- Paper published in the *Journal of Refractive Surgery*

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 4th 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 7th 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 55th Annual Meeting of the Association for Computational Linguistics*

Arabic Named Entity Recognition via Deep Co-learning

AMERICAN UNIVERSITY OF BEIRUT

June 2016 - June 2017

- 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 the *Artificial Intelligence Review*

Adaptive QoS for Spark Applications

June 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 7th International Conference on Cloud Computing and Services Science*

Teaching Experience

Teaching Assistant

September 2021 – Present

TÉLÉCOM PARIS, INSTITUT POLYTECHNIQUE DE PARIS

- Mining of Large Datasets
- Bases de Données

Teaching Assistant

May 2021 – June 2021

TÉLÉCOM PARIS, INSTITUT POLYTECHNIQUE DE PARIS

- Données du Web

Teaching Assistant

Feb. 2015 – May 2020

AMERICAN UNIVERSITY OF BEIRUT

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

Teaching Assistant

Feb. 2013 – June 2013

NOTRE DAME UNIVERSITY - LOUAIZE

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

Work Experience

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

Journal Papers

- [1] Shady Awwad, Lily Chacra, **Chadi Helwe**, Ahmad Dhaini, Talar Telvizian, Julien Torbey, Maamoun Abdul Fattah, Emilio Torres-Netto, Farhad Hafezi, and Rohit Shetty, "Mitomycin C Application After Corneal Cross-linking for Keratoconus Increases Stromal Haze", In: *Journal of Refractive Surgery*, 37(2), 83-90, 2021
- [2] **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**, Chloé Clavel and Fabian Suchanek, "Reasoning with Transformer-based Models: Deep Learning, but Shallow Reasoning", In: *Proceedings of the 3rd Conference on Automated Knowledge Base Construction (AKBC 2021)*, Ivry (Virtual), United States, October 2021
- [2] **Chadi Helwe**, Shady Elbassuoni, Ahmad Dhaini, Lily Chacra and Shady Awwad, "A Deep Learning Approach to Detect the Demarcation Line in OCT Images", In: *Proceedings of the 24th Annual Conference on Medical Image Understanding and Analysis (MIUA 2020)*, 387-399, Oxford (Virtual), United Kingdom, July 2020
- [3] **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
- [4] 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
- [5] 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**, Ghassan Dib, Mohsen Shamas, Shady Elbassuoni, "A Semi-Supervised BERT Approach for Arabic Named Entity Recognition", In: *Proceedings of the 5th Arabic Natural Language Processing Workshop (WANLP@COLING 2020)*, 49-57, Barcelona (Virtual), Spain, December 2020
- [2] **Chadi Helwe**, Shady Elbassuoni, Ayman Al Zaatari 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
- [3] 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
- [4] Shady Awwad, Lily Chacra, **Chadi Helwe**, Ahmad Dhaini, Farhad Hafezi, Emilio Torres and Talar Telvizian, "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**, Chloé Clavel and Fabian Suchanek, “Reasoning with Transformer-based Models: Deep Learning, but Shallow Reasoning”, In: *Proceedings of the 3rd Conference on Automated Knowledge Base Construction (AKBC 2021)*, Ivrine (Virtual), United States, October 2021
- [2] **Chadi Helwe**, Ghassan Dib, Mohsen Shamas, Shady Elbassuoni, “A Semi-Supervised BERT Approach for Arabic Named Entity Recognition”, In: *Proceedings of the 5th Arabic Natural Language Processing Workshop (WANLP@COLING 2020)*, 49-57, Barcelona (Virtual), Spain, December 2020
- [3] **Chadi Helwe**, Shady Elbassuoni, Ahmad Dhaini, Lily Chacra and Shady Awwad, “Detection of Demarcation Line in OCT Images using Semi-Weakly Supervised Learning”, In: *Proceedings of the 24th Annual Conference on Medical Image Understanding and Analysis (MIUA 2020)*, 387-399, Oxford (Virtual), United Kingdom, July 2020
- [4] **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

Selected Projects

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

- 2019, 2021 External Reviewer for the Artificial Intelligence Review
- 2021 External Reviewer for Natural Language Engineering
- 2020 External Reviewer for the IEEE Transactions on Asian and Low-Resource Language Information Processing
- 2019 External Reviewer for the IEEE Transactions on Neural Networks and Learning Systems
- 2019 External Reviewer for the MADAR Shared Task - WANLP
- 2017 External Reviewer for 5th International Conference on Big Data Analytics

Awards and Scholarships

- 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

Summer Schools Attended

- 2021 Machine Learning Summer School (MLSS), Taipei, Taiwan
- 2021 4th Advanced Course on Data Science and Machine Learning (ACDL), Tuscany, Italy

Skills

Languages Python, Java, C++, SQL

Frameworks Pytorch, Keras, Scikit-learn, NLTK, NumPy, Pandas, Django, Flask, SQLAlchemy

Others Microsoft Office, Latex

Languages

French Fluent

English Fluent

Arabic Mother Tongue

Research Interests

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

References

Available Upon Request