

Chadi HELWE

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EDUCATION

PRESENT	<i>Doctor of Philosophy in Artificial Intelligence</i> - Institut Polytechnique de Paris	
2021	Ph.D.'s Thesis: Neuro-symbolic Methods for Textual Logical Reasoning Advisors: Prof. Fabian Suchanek and Prof. Chloé Clavel	
2017	<i>Master of Science in Computer Science</i> - American University of Beirut	GPA: 3.68/4
2015	Master's Thesis: Arabic Named Entity Recognition via Deep Co-learning Advisor: Prof. Shady Elbassuoni	
2014	<i>Bachelor of Science in Computer Science</i> - Notre Dame University - Louaize	GPA: 3.63/4
2010	Final Year Project: Educaly - An Educational Social Network Advisor: Prof. Marie Khair	

SELECTED WORK EXPERIENCE

PRESENT	<i>Graduate Research Assistant</i> - Institut Polytechnique de Paris, France	
JAN. 2021	Developing methods to combine symbolic and neural approaches for textual logical reasoning. [1, 2, 3]	
DEC 2020	<i>Research Engineer</i> - Institut Polytechnique de Paris, France	
SEP 2020	Investigated performance of transformers on different reasoning tasks [3].	
AUG 2020	<i>Research Assistant</i> - American University of Beirut, Lebanon	
OCT 2017	<ul style="list-style-type: none">• Retrieving Textual Evidence for Knowledge Graph Facts using Deep Learning:<ul style="list-style-type: none">- A project in collaboration with Aalborg University (Denmark) and Hacettepe University (Turkey).- 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 [4, 5, 6, 7]:<ul style="list-style-type: none">- A project in collaboration with the Department of Ophthalmology (American University of Beirut Medical Center) and the ELZA Institute in Zurich (Switzerland).- Redesignated an outdated software to detect and measure corneal haze and demarcation line in different types of Optical Coherence Tomography (OCT) images.- Added new features and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 methods 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 and 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.• Predicting Arabic Blog Credibility using Deep Co-learning [8]:<ul style="list-style-type: none">- 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.	
SEPT 2017	<i>Graduate Research Assistant</i> - American University of Beirut, Lebanon	
JUNE 2016	<ul style="list-style-type: none">• Arabic Named Entity Recognition via Deep Co-learning [9, 10]:<ul style="list-style-type: none">- 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.• ICD and CCS Coding using Deep Learning [11]:<ul style="list-style-type: none">- A project in collaboration with the Department of Emergency Medicine (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.	

- **Methodical Evaluation of Arabic Word Embeddings [12]:**
 - A project in collaboration with Qatar University.
 - 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.
- **Adaptive QoS for Spark Applications [13]:**
 - Developed an adaptive quality management/selection method for Spark applications.
 - Implemented different QoS policies in Java.

OPEN SOURCE PROJECTS

PRESENT **LogiTorch** - Creator and Maintainer
 DEC 2021 LogiTorch [2] is a PyTorch-based library that includes different logical reasoning benchmarks, different models, as well as utility functions such as co-reference resolution. The library allows researchers and developers to easily use a logical reasoning dataset and train logical reasoning models with just a few lines of code.

SKILLS

Python, Java, C++, PyTorch, Pandas, Numpy, Keras, L^AT_EX

AWARDS

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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.
 - 2013 Dean's List for the Spring semester.
 - 2012 Dean's List for the Spring and the Fall semesters.

PUBLICATIONS

- [1] Chadi Helwe, Simon Coumes, Chloé Clavel, and Fabian Suchanek. "TINA: Textual Inference with Negation Augmentation". In: *Findings of the Association for Computational Linguistics: EMNLP 2022*. 2022.
- [2] Chadi Helwe, Chloé Clavel, and Fabian Suchanek. "LogiTorch: A PyTorch-based library for logical reasoning on natural language". In: *Proceedings of the 2022 Conference on Empirical Methods in Natural Language Processing: System Demonstrations*. 2022.
- [3] Chadi Helwe, Chloé Clavel, and Fabian M Suchanek. "Reasoning with Transformer-based Models: Deep Learning, but Shallow Reasoning". In: *3rd Conference on Automated Knowledge Base Construction*. 2021.
- [4] 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: *International CXL Experts Meeting 2019*. 2019.
- [5] 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: *International CXL Experts Meeting 2019*. 2019.
- [6] Chadi Helwe, Shady Elbassuoni, Ahmad Dhaini, Lily Chacra, and Shady Awwad. "A Deep Learning Approach to Detect the Demarcation Line in OCT Images". In: *Annual Conference on Medical Image Understanding and Analysis*. Springer. 2020.
- [7] Shady T Awwad, Lily M Chacra, Chadi Helwe, Ahmad R Dhaini, Talar Telvizian, Julien Torbey, Maamoun Abdul Fattah, Emilio A Torres-Netto, Farhad Hafezi, and Rohit Shetty. "Mitomycin C application after corneal cross-linking for keratoconus increases stromal haze". In: *Journal of Refractive Surgery* (2021).
- [8] Chadi Helwe, Shady Elbassuoni, Ayman Al Zaatari, and Wassim El-Hajj. "Assessing Arabic Weblog Credibility via Deep Co-learning". In: *Proceedings of the Fourth Arabic Natural Language Processing Workshop*. Association for Computational Linguistics, 2019.
- [9] Chadi Helwe and Shady Elbassuoni. "Arabic named entity recognition via deep co-learning". In: *Artificial Intelligence Review* (2019).
- [10] Chadi Helwe, Ghassan Dib, Mohsen Shamas, and Shady Elbassuoni. "A Semi-Supervised BERT Approach for Arabic Named Entity Recognition". In: *Proceedings of the Fifth Arabic Natural Language Processing Workshop*. Association for Computational Linguistics, 2020.

- [11] 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 2017 International Conference on Digital Health*. 2017.
- [12] 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 (Volume 2: Short Papers)*. 2017.
- [13] 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*. 2017.