

# Housam Babiker

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**CONTACT INFORMATION** Department of Computing Science housamkhalifa.github.io University of Alberta,  
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**RESEARCH INTERESTS** Research on making **deep learning** and **deep reinforcement learning** more interpretable and explainable is receiving much attention. One of the main reasons is the application of deep learning models to high-stake domains. Also, using explanations as a proxy for debugging models so that we could improve performance, learn new insights, and how we can leverage XAI methods to model's compression and knowledge distillation. In general, interpretability is an essential component for deploying deep learning models. I'm interested in deep learning Explainability, Interpretability, Fairness, Robustness, and the application of **XAI** techniques. My current research focuses on developing **self-explainable** deep learning models capable of explaining their predictions (i.e., teaching machines to predict and explain simultaneously).

**EDUCATION** **PhD in Computing Science** Sep. 2016 - Nov 2022  
University of Alberta Edmonton, Canada

- Academic Supervisor: Prof. Randy Goebel  
Research project: Building a self-explainable deep neural network. Unlike traditional XAI techniques that employ post-hoc techniques to explain a black box. My work focuses on building deep interpretable models. Interpretable models are better because they can provide faithful explanations. In order to build such a model, we need to focus on constrained optimization problems, i.e., the predictive power is subject to the quality of the explanations. During my Ph.D., I worked on different problems to improve the levels of abstraction, such as feature attribution, contrastive explanations, rationale-based models, hierarchical explanations, and knowledge distillation.

**MSc in Information Technology** 2013 - 2015  
Multimedia University Melaka, Malaysia

- Academic Supervisor: Prof. Lau Siong Hoe  
Thesis title: Design and Evaluation of a Shoulder Surfing Resistant Authentication System.

**Bachelor in Information Technology** 2007 - 2011  
Multimedia University Melaka, Malaysia

- Thesis title: Face recognition using local graph structure.

**WORK EXPERIENCE** **Graduate Research Assistant** Sep 2019 - Present  
Department of Computing Science, University of Alberta Edmonton, Canada

- Carrying out research on the development of XAI techniques for deep learning at the XAI lab under the supervision of Prof. Randy Goebel.
- Supervisor: rgoebel@ualberta.ca

**Machine Learning Engineer** Dec. 2019 - Now  
AltaML. Edmonton, Canada

- Developed NLP models for legal domains, constructions (e.g., predictive models, semantic search, model in the loop, keyword extraction) and presented the findings to senior executive management.

- Developed NLP models to understand the legal cases in order to segment them in meaningful contexts.
- Worked on models compression to improve the inference speed (e.g., quantization, TensorRT).
- Provided regular progress reports to manager both verbally and in writing, and turned data into further actionable decisions.
- Mitacs university supervisor: rgoebel@ualberta.ca

#### Research Assistant

Oct. 2018 - Feb. 2019

Department of Family medicine

University of Alberta, Canada

- Developed a tool to extract medical information from Electronic Medical Records.
- Contact: Marjan.Abbasi@albertahealthservices.ca

#### Research Assistant

2013 - 2015

Information security lab, Multimedia University

Edmonton, Canada

- Research on biometrics, computer vision and image processing.
- Supervisor: lau.siong.hoe@mmu.edu.my

## RESEARCH ARTICLES

10. **Housam Babiker**, Mi-Young Kim, Randy Goebel, SFFA: Softmax For Feature Attribution (submitted). Proceedings of the Conference on Empirical Methods in Natural Language Processing (**EACL**) (20 pages) 2022.
9. **Housam Babiker**, Mi-Young Kim, Randy Goebel Locally Distributed Activation Vectors for Guided Feature Attribution in **COLING 2022**(Accepted).
8. **Housam Babiker**, Mi-Young Kim, Randy Goebel Neural Networks with Feature Attribution and Contrastive Explanations in **ECML PKDD 2022**(in press).
7. Mi-Young Kim, Shahin Atakishiyev, **Housam Babiker**, Nawshad Farruque, Randy Goebel, Osmar R. Zaiane, Mohammad-Hossein Motallebi, Juliano Rabelo, Talat Syed, Hengshuai Yao, Peter Chun. A Multi-Component Framework for the Analysis and Design of Explainable Artificial Intelligence. Machine Learning and Knowledge Extraction, Special Issue on Advances in Explainable Artificial Intelligence - MDPI, 3, pp900-921, 2021.
6. **Housam Babiker**, Mi-young Kid and Randy Goebel. DISK-CSV: Distilling Interpretable Semantic Knowledge via Class Semantic Vector. The 16th conference of the European Chapter of the Association for Computational Linguistics (**EACL**) 2021. Accepted. April 21-23, Kyiv, Ukraine.
5. **Housam Babiker**, Mi-young Kid and Randy Goebel. RANCC: Rationalizing Neural Networks via Concept Clustering. The 28 International Conference on Computational Linguistics (**COLING**) 2020. December 8-13 Barcelona, Spain.
4. **Housam Babiker** and Randy Goebel. An Introduction to Deep Visual Explanation. Neural Information Processing Systems (NIPS) 2017 Workshop, Interpreting, Explaining and Visualizing Deep Learning. Long Beach, USA.
3. **Housam Babiker** and Randy Goebel. Using KL-divergence to focus Deep Visual Explanation. Neural Information Processing Systems (NIPS) 2017 Symposium on Interpretable Machine Learning 2017, Long Beach, USA, (Selected for a spotlight presentation).
2. **Housam Babiker**, Randy Goebel, and, Irene Cheng. Facial expression using SVM classifier on salient mic-macro patterns. Proc. International Conference

on Image Processing (**ICIP**), Beijing, China, 2017.ith symmetric local graph structure (slgs). Expert Systems with Applications. 41(14)6131-61372014.

1. **Housam Babiker** and Eimad Eldin Abdu Abusham. Face Recognition Using Local Graph Structure. International Conference on Human-Computer Interaction. Orlando, Florida, USA 2011.

## TEACHING

- **CMPUT 174: Intro. to the Found. of Computation I** Fall 2017  
Prof. Jörg Sander and Sadaf Ahmed's teaching assistant (TA) at the University of Alberta.
- **CMPUT 414: Introduction to Multimedia Technology,** Fall 2019  
Prof. Anup Basu's TA for the senior undergraduate level course at the University of Alberta
- **CMPUT 101: Introduction to Computing,** Fall 2016  
Prof. Janelle Harms's TA for the senior undergraduate level course at the University of Alberta

## OTHER TALKS

- **Research Poster at AI Week** May 2022  
Presented a paper entitled "Self-explainable models in natural language processing" at AI Week in Edmonton, Canada.
- **COLING 2020, Barcelona** Dec. 2020  
Presented a paper entitled "RANCC: Rationalizing Neural Networks via Concept Clustering"(Online).
- **ICIP 2027, China** Sept. 2017  
Presented a paper entitled "acial expression using SVM classifier on salient mic-macro patterns"(ICIP, Beijing, China).
- **Reverse EXPO** Feb. 2017  
Presented a poster of the "An Introduction to Deep Visual Explanation" article to the audience of diverse background in Edmonton, Canada.

## ACADEMIC SERVICE

- Reviewer for the Journal of Artificial Intelligence Research (JAIR), EMNLP 2020, ICDM 2020, ECML-PKDD 2020,2022.
- Local Arrangement Chair, The 2017 IEEE International Conference on Systems, Man, and Cybernetics. Oct 5-Oct 8. Banff, Canada.
- Maintaining the Explainable AI (XAI) lab website <https://sites.ualberta.ca/~amiixai/>.

## TECHNICAL STRENGTH

- **Programming:** Python, C++, SQL, Matlab.
- **Frameworks:** Tensorflow, PyTorch, Keras, NLTK, OpenCV, Scikit-Learn, Pandas.
- **Databases:** MySQL

## HONORS & AWARDS

- **Mary Louise Imrie Graduate Student Award 2022.**
- **Highest performance on task 4 of the COLIEE competition 2018,** Japan.
- **GSA Travel Award 2017,** university of Alberta.

- Multimedia university **research scholar Award**.
- **Dean List**, Multimedia University.
- 2013 Infineon-MMU Technical Poster Session, Infineon, **Champion**.
- 2014 Infineon-MMU Technical Poster Session, Infineon, **Champion**.
- 2015 Infineon-MMU Technical Poster Session, Infineon, **1st Runner up**.
- Pecipta by Ministry of Education (MOE), **Best of the Best Award**, International Conference and Exposition on Innovation of Institution of Higher Learning, Nov-2013, Kuala Lumpur Convention Centre, Malaysia.
- Pecipta by Ministry of Education (MOE), **Gold Award**, International Conference and Exposition on Innovation of Institution of Higher Learning, Nov-2013, Kuala Lumpur Convention Centre, Malaysia.
- **Korean Invention Academy Award**, Malaysia, International Conference and Exposition on Innovation of Institution of Higher Learning, Nov-2013, Kuala Lumpur Convention Centre.
- **ITEX Silver Award**, Malaysia, Invention Innovation Technology Exhibition (ITEX) 2013 by MINDS.
- WIC- **Gold Medal**, Seoul, South Korea, World Invention Innovation Contest (WIC) 5-6-June. 2015.
- **ITEX Silver Award**, Invention Innovation Technology Exhibition (ITEX) 2015 by MINDS, Kuala Lumpur Convention Centre, Malaysia.
- Pukyong National University, South Korea, **scholarship for Master of Science (declined)**.
- Multimedia university, **graduate research assistant for PhD, (Declined)**.
- C++ programming Competition, **2nd Runner up**, multimedia university, Melaka, Malaysia.