

# 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 the explanations to reduce the number of parameters (e.g., **model's compression**, **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 level of abstraction, such as feature attribution, contrastive explanations, rationale-based models, 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 - August 2022  
Mitacs intern. 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

11. **Housam Babiker**, Mi-Young Kim, Randy Goebel, SFFA: Softmax For Feature Attribution (submitted). Proceedings of the Conference on Empirical Methods in Natural Language Processing (**EMNLP**) (20 pages) 2022.
10. **Housam Babiker**, Mi-Young Kim, Randy Goebel Locally Distributed Activation Vectors for Guided Feature Attribution in **COLING 2022**(Accepted).
9. **Housam Babiker**, Mi-Young Kim, Randy Goebel Neural Networks with Feature Attribution and Contrastive Explanations in **ECML PKDD 2022**(in press).
8. 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.
7. **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.
6. **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.
5. **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.
4. **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).
3. **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.

2. Abdullah M., Sayeed S., Muthu S., **Babiker H.**, Azman A., and Ibrahim Yousif. Face recognition with 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
- **Other:** Linux Command Line, Bash Scripting, GitHub, Version Control

## HONORS & AWARDS

- **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.