Housam Babiker

CONTACT INFORMATION Department of Computing Science housamkhalifa.github.io University of Alberta, Edmonton, Canada Email: khalifab@ualberta.ca

RESEARCH INTERESTS Research interests include a broad area of Explainable Artificial Intelligence (XAI), Machine Learning, Deep Learning, Reinforcement Learning, and their applications in real-world problems.

EDUCATION

PhD in Computing Science Sep. 2016 - Jan 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., qunatization, 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

9. **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.
8. **Housam Babiker**, Mi-Young Kim, Randy Goebel Locally Distributed Activation Vectors for Guided Feature Attribution in **COLING 2022**(Acceptance rate: 33%).
7. **Housam Babiker**, Mi-Young Kim, Randy Goebel Neural Networks with Feature Attribution and Contrastive Explanations in **ECML 2022**(Acceptance rate: 26%).
6. 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.
5. **Housam Babiker**, Mi-young Kid and Randy Goebel. DISK-CSV: Distilling Interpretable Semanic 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 (Acceptance rate: 24.7%).
4. **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 (Acceptance rate: 32.9%).
3. **Housam Babiker** and Randy Goebel.An Introduction to Deep Visual Explanation. Neural Information Processing Systems (NeurIPS-Workshop) 2017. Long Beach, USA.
2. **Housam Babiker** and Randy Goebel. Using KL-divergence to focus Deep Visual Explanation. Neural Information Processing Systems (NeurIPS-Workshop) 2017 Symposium on Interpretable Machine Learning 2017,Long Beach, USA.
1. **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.

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.