Mohamed A Abdelsalam

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Objective

Passionate and innovative Machine Learning Research Engineer with extensive experience in multimodal deep learning, seeking to leverage my skills in a challenging and creative environment. Proven track record in research and development, aiming to contribute to cutting-edge projects in machine learning and artificial intelligence.

Experience

Machine Learning Research Engineer, **Samsung AI Center** *Toronto, Canada • July 2021 - Present*

- Specialized in multimodal learning at the intersection of vision and language, with extensive application of foundation models and Large Language Models (LLMs) across the various projects.
- Served as the lead author in two team-based research projects:
  - Developing a generative deep learning model for procedural video step anticipation. (ICCV 2023)
  - Developing a new method for visual scene understanding using Abstract Meaning Representations, emphasizing higher-level semantic concepts. (CoNLL 2022)
- Implemented and managed a versatile internal repository for easy evaluation of different text-image retrieval models in a modular fashion, as part of our work in enhancing image search capabilities in smartphone galleries using natural language processing.
- Working on personalizing image search experience by augmenting embedding based VLMs with image metadata and gallery context.
- Contributed to creating a stories/memories generation module for the user gallery in an unsupervised manner, as opposed to the existing template based modules.

Research Assistant, **Mila/University of Montreal** *Montreal, Canada • Sep 2019 - Jun 2021*

- Engaged in research in Incremental and lifelong deep Learning, culminating in a CVPR publication and thesis.
- Co-authored a SIGDial paper, focusing on applying a semantic loss to enhance small generative dialogue models.
- Contributed to a comprehensive primer on Lifelong Learning, describing key methodologies in the field.

Machine Learning Intern, **National Bank of Canada** *Montreal, Canada • May 2019 - Sep 2019*

- Worked on security and anomaly detection using ML techniques.

ML Teaching Assistant, **Zewail University of Science and Technology** *Cairo, Egypt • Sep 2018 - Dec 2018*

Undergraduate Research Intern, **Computer Vision Lab, ETH Zurich** *Switzerland • June 2016 - Sep 2016*

- Worked on Learning based Super-Resolution using Sparse Representations.

Skills

Programming Languages: Python (Expert); C/C++, MATLAB, SQL (Familiar); C#, Java (Beginner)

Frameworks: Pytorch (Expert); Tensorflow, Keras (Familiar)

Tools: Numpy, Pandas, scikit-learn, NLTK, Git, Slurm

Languages: Arabic (Native), English (Fluent), French (Intermediate)

Education

Mila/University of Montreal *Montreal, Canada • 2019 - 2021*
MSc in Machine Learning
Thesis: IIRC - Incremental Implicitly-Refined Classification Adviser: Sarath Chandar

Zewail University of Science and Technology *Cairo, Egypt • 2013 - 2018*
BSc Aerospace Engineering
Graduation Project: Attribute-based Face Generation Using Progressive GANs Adviser: Elsayed Hemayed

Publications

GePSAn: Generative Procedure Step Anticipation in Cooking Videos **ICCV 2023**
***Mohamed Abdelsalam**, Samrudhdhi Rangrej, Isma Hadji, Nikita Dvornik, Konstantinos Derpanis, Afsaneh Fazly*
Developed a generative deep learning model for next-step prediction in procedural videos, achieving top results on YouCookII and enabling zero-shot text-to-video domain transfer.

Visual Semantic Parsing: From Images to Abstract Meaning Representation **CoNLL, 2022**
***Mohamed Abdelsalam**, Zhan Shi, Federico Fancellu, Kalliopi Basioti, Dhaivat Bhatt, Vladimir Pavlovic, Afsaneh Fazly*
A new method for visual scene understanding by using Abstract Meaning Representation (AMR) to create linguistically informed visual AMR graphs that focus on higher-level semantic concepts.

IIRC: Incremental Implicitly-Refined Classification **CVPR, 2021**
***Mohamed Abdelsalam**, Mojtaba Faramarzi, Shagun Sodhani, Sarath Chandar*
A setup and benchmark to evaluate lifelong learning models in more dynamic and real-life aligned scenarios.

A Brief Study on the Effects of Training Generative Dialogue Models with a Semantic loss **SIGDial, 2021**
Prasanna Parthasarathi , **Mohamed Abdelsalam***, Joelle Pineau, Sarath Chandar*
A study on the use of an auxiliary semantic loss as a way of encouraging generative dialogue models diversify their responses.

Books

An Introduction to Lifelong Supervised Learning **2022**
*Shagun Sodhani, Mojtaba Faramarzi, Sanket Vaibhav Mehta, Pranshu Malviya, **Mohamed Abdelsalam**, Janarthanan Janarthanan, Sarath Chandar*
This primer is an attempt to provide a detailed summary of the different facets of lifelong learning.

Other Projects

TT-Transformer, Matrix and Tensor Factorization for ML IFT6760A Winter 2019
- Compressed the Transformer architechture using Tensor Train Decomposition.
- Achieved a compression rate of 2.58 with a minimal loss in accuracy on the task of Machine Translation.

Attribute-based Face Generation Using Progressive GANs, Bachelor Project Spring 2018
- Used conditional GANs to create realistic faces given a set of face attributes.
- The network was built upon Progressively Growing GANs.

RollX, Dynamics Course SPC 218 (Simulation video here, Trial video here) Spring 2015
- Designed and manufactured a Cubli inspired jumping machine based on the conservation of angular momentum.

References available upon request.