Badr **ALKHAMISSI**

Al Researcher

🗞 https://bkhmsi.github.io 🕠 github.com/bkhmsi in linkedin.com/in/bkhmsi 🎓 scholar.google.com/bkhmsi

I am passionate about building sample efficient intelligent systems that can solve complex machine learning tasks and at the same time reveal insights about the inner workings of biological agents. Such systems do not only pave a way for solving long-standing societal problems but also shed light on what it means to be human. Please see website for a more detailed resumé.



September 2020 September 2019

Goldsmiths, University of London, MASTER OF SCIENCE, London, UK

- > MSc. in Computational Cognitive Neuroscience Pass with Distinction.
- > Thesis: Episodic Meta-Reinforcement Learning on the Two-Step and Harlow Tasks (Grade: 90%).

June 2018 September 2014

The American University in Cairo, BACHELOR OF SCIENCE, Cairo, Egypt

- > BSc. in Computer Science Summa Cum Laude. GPA 4.0
- > President's Cup and Mohamed El Beleidy Academic Award for class valedictorian.
- > Mohammed Bin Abdulkarim A. Allehedan Award for highest performing STEM student.
- > Academic Achievement Scholarship.
- > Thesis: Video Search using Natural Language.

July 2017

Tsinghua University, DEEP LEARNING SUMMER SCHOOL, Beijing, China

- > Thorough training in deep learning, covering many applications in Computer Vision, NLP, Knowledge Graph, Social Media Analysis, Multimodal Analysis and Robotics.
- > Outstanding Performance Award in Deep Learning Summer School at Tsinghua University.

December 2016

Stony Brook University, SEMESTER ABROAD, New York, United States

August 2016

> Best Junior Award in Stony Brook ACM Regional Qualification Contest.

> Abdallah Jum'ah Study Abroad Scholarship.

September 2011

June 2014 | Manor House School, International General Certificate of Secondary Education, Cairo, Egypt

> Outstanding Cambridge Learner Award in AL Computing.



RESEARCH AND INDUSTRIAL EXPERIENCE

November 2022 November 2021

Al Resident, META Al, Seattle, US

> Conducting Research in NLP. Written 6 first-author papers + 1 co-author paper. (See Publications)

NLP | Hate Speech | Responsible AI | Reasoning | Arabic NLP | FAIR

October 2021 March 2021

Research Intern, Sony AI, Tokyo, Japan (Remotely)

> Published 2 papers in collaboration with DeepMind and 1 paper with Sony CSL. (See Publications) Meta-learning Reinforcement learning Symbolic Alchemy

September 2019

Applied Scientist, MICROSOFT ADVANCED TECHNOLOGY LAB IN CAIRO, Cairo, Egypt

April 2019

> Part of the LUIS Applied Science Team and the Machine Teaching Innovation Group.

- > Research in Cross-Lingual Model Transfer.
- > Best Mentor Award.
- > First Place in MS ATLC Hackathon.

NLU NLP MT Keras Tensorflow PyTorch Python C#

March 2019

Machine Intelligence Researcher, VKANSEE, Cairo, Egypt

January 2018

> Research in fingerprint matching, spoofing and quality analysis through deep learning.

> Optimize implementations for speed and space to suit embedded devices with restricted resources. Computer Vision Few-Shot Learning Keras Tensorflow Python C++ QT

September 2018 June 2018

Software Engineer, MICROSOFT ADVANCED TECHNOLOGY LAB IN CAIRO, Cairo, Egypt

- > Researching the applicability of multilingual bot-interaction through Machine Translation.
- > Mentoring Summer Intern.
- > Developed Node CLI tool for MS Language Generation, part of Bot-Framework tools.
- > Incorporate Machine Translation into MS Bot-Framework.

Visual Studio C# NodeJS JavaScript TypeScript Python NET MT

& Spring '16

Undergraduate Teaching Assistant, THE AMERICAN UNIVERSITY IN CAIRO, Cairo, Egypt

- > Teaching assistant for Deep Learning and Programming Fundamentals courses.
- > Hold regular office hours to help students.
- > Give sessions and workshops to assist students with their coursework.

C++ Python Tensorflow Keras SFML

Winter '16 & Summer '15

Software Development Engineer Intern, MICROSOFT ADVANCED TECHNOLOGY LAB IN CAIRO, Cairo, Egypt

- > Supporting full-text search for MS Language Understanding Intelligent Service (LUIS) utterances.
- > Migrating existing LUIS database from Azure to MS SQL Server and adjusting LUIS features that uses this database accordingly.
- > Design and implement the application import/export feature on LUIS.
- > Developing different applications (iOS, Windows Phone and an Office Extension) that utilizes LUIS.

C# F# Swift Objective-C iOS Windows Phone .NET Visual Studio Xcode



PUBLICATIONS & CONFERENCES

PREPRINT

SHADOW-CAVE MODELS: HOW PLATO'S ALLEGORY ILLUMINATES THE LIMITATIONS OF LARGE LANGUAGE MODELS ✓ Paper

A short paper that highlights the limitations of LLMs in the context of Plato's allegory.

First Author LLMs Philosophy NLP Independent

OPT-R: FINETUNED LANGUAGE MODELS ON EXPLANATIONS ARE BETTER FEW-SHOT REASONERS

UNDER PREPARATION FOR

NL-REASONING/ACL 2023

Under Preparation

Measuring the contribution of explanations when meta-finetuning large language models of different scales on eight reasoning datasets.

First Author NLP Reasoning Meta Al

ALERT: ADAPT LANGUAGE MODELS TO REASONING TASKS

UNDER REVIEW AT ACL 2023

☑ Paper

ALERT provides a test bed to asses any language model on fine-grained reasoning skills, which spans over 20 datasets and covers 10 different reasoning skills

NLP Reasoning Meta Al

ARAPOET: CONTROLLED ARABIC POETRY GENERATION WITH A TWIST

In Submission

Paper

Finetuning a monolingual Arabic model and a multilingual one then combining them at decode time for controlled poetry generation.

First Author | NLP | Creative AI | Meta AI

Token: Task Decomposition and Knowledge Infusion for Few-Shot Hate Speech Detection Accepted at EMNLP 2022

Few-shot Hate Speech detection through task decomposition and knowledge infusion that is more generalizable and robust. First Author | Oral Presentation | Hate Speech | NLP | Efficient NLP | Responsible AI | Meta AI

DEPTH-WISE ATTENTION (DWATT): A LAYER FUSION METHOD FOR DATA-EFFICIENT CLASSIFICATION NEURIPS/ENLSP 2022

ACCEPTED AT

☑ Paper ☑ Poster

Few-shot Hate Speech detection through task decomposition and knowledge infusion that is more generalizable and robust. First Author Poster Presentation NLP Efficient NLP Meta Al

META AI AT ARABIC HATE SPEECH 2022: MULTITASK LEARNING WITH SELF-CORRECTION FOR HATE SPEECH CLASSIFICATION ACCEPTED AT OSACT5/LREC 2022

P Best Paper Award ✓ Paper Tweets

We tackle the Arabic Fine-Grained Hate Speech Detection shared task and demonstrate significant improvements over reported baselines for its three subtasks.

First Author Oral Presentation Best Paper Hate Speech NLP ArabicNLP Responsible AI Meta AI

A REVIEW OF LANGUAGE MODELS AS KNOWLEDGE BASES

UNDER REVIEW AT JAIR 2022

✓ Paper
✓ Tweets

We present a set of aspects that we deem a LM should have to fully act as a KB, and review the recent literature with respect to those aspects.

First Author Survey NLP Meta AI

EPIPHENOMENAL REPRESENTATIONS OF ABSTRACT RULES IN A CONNECTIONIST MODEL OF THE DELAYED MATCH TO SAMPLE TASK ACCEPTED AT COSYNE 2022 ✓ Paper ✓ Poster We show that abstract rule representations do not guide a biologically inspired artifical agent in solving the DMS task. First Author CogSci Neuroscience Sony Al DeepMind How to Learn and Represent Abstractions: An Investigation using Symbolic Alchemy Accepted at AutoML/AutoML 2022 ✓ Paper ✓ Poster First steps toward using Symbolic Alchemy to identify design choices that enable agents to learn various types of abstraction. First Author Meta-RL Neuroscience Sony Al DeepMind THE EMERGENCE OF ABSTRACT AND EPISODIC NEURONS IN EPISODIC META-RL ACCEPTED AT NEURIPS/MEMARI 2022 & ICLR/LEARNING-TO-LEARN 2021 ☑ Paper ☑ Poster We analyze the reinstatement mechanism introduced by Ritter et al. (2018) to reveal two classes of neurons that emerge in the agent's working memory (an epLSTM cell) when trained using episodic meta-RL. First Author | Spotlight | Meta-RL | Neuroscience | Sony Al | DeepMind ADAPTING MARBERT FOR IMPROVED ARABIC DIALECT IDENTIFICATION ACCEPTED AT EACL/WANLP 2021 🗹 Paper 🖸 Demo 🖸 Poster 🕠 github.com/mohamedgabr96/NeuralDialectDetector We tackle the second Nuanced Arabic Dialect Identification (NADI) shared task and succeed in achieving state-of-the-art results on all of its four subtasks. First Author | Oral Presentation | ArabicNLP | NLP DEEP DIACRITIZATION: EFFICIENT HIERARCHICAL RECURRENCE FOR IMPROVED ARABIC DIACRITIZATION COLING/WANLP 2020 ☑ Paper ☑ Demo 🕠 github.com/bkhmsi/deep-diacritization We propose a novel architecture for automatically restoring Arabic diacritics that outperforms previous SOTA methods. First Author | Oral Presentation | Main Paper | ArabicNLP | NLP DEEP SPIKING NEURAL NETWORKS WITH RESONATE-AND-FIRE NEURONS PREPRINT We explore a new Spiking Neural Network (SNN) formulation with Resonate-and-Fire neurons (RAF). First Author Neuroscience SNN PROGRAM COMMITTEE MEMBER (REVIEWER) Multilingualism and Cross-Lingual NLP Track at ACL 2023. ENLSP Workshop at NeurIPS 2022. Language Modeling and Analysis of Language Models Track at EMNLP 2022. Main Track and Late-Breaking Workshop at AutoML 2022. I (Still) Can't Believe It's Not Better! Workshop at NeurlPS 2021. Meta-Learn Workshop at NeurlPS 2021. Learning to Learn Workshop at ICLR 2021. Meta Learn Workshop at NeurIPS 2020. **ORAL PRESENTATION** EMNLP 2022. MemARI at NeurIPS 2022. OSACT5 at LREC 2022. WANLP at EACL 2021. WANLP at COLING 2020.

POSTER PRESENTATION

ENLSP at NeurIPS 2022. AutoML Workshop at AutoML 2022. Learning to Learn at ICLR 2021.

Selected Projects

EPISODIC META-RL ON THE TWO-STEP AND HARLOW TASKS JUNE 2020 - AUGUST 2020 Blog Post github.com/bkhmsi/Meta-RL-TwoStep-Task github.com/bkhmsi/Meta-RL-Harlow MSc. Dissertation. Reproduces the results of animal behavior and artificial agents on both the Two-Step and Harlow tasks using an episodic meta-RL model that combines 3 RL systems inspired from the machine learning and neuroscience literature. Python PyTorch Meta-RL RL EMRL Neuroscience VIDEO SEGMENT RETRIEVAL BY TEXT QUERIES SEPTEMBER 2017 - MAY 2018

☑ Video ☑ Poster • github.com/bkhmsi/forget-me-not

<u>Undergraduate Thesis Project.</u> Proposes a framework for searching long untrimmed videos for segments that logically correlate with a natural language query.

Python PyTorch Tensorflow Keras Computer Vision NLP

SKETCH INVERSION USING DEEP CONVOLUTIONAL NEURAL NETWORKS

MAY 2017

Synthesising photo-realistic images from pencil sketches of human faces and architectural drawings of buildings.

Python Tensorflow Keras Computer Vision

KORASTAK.COM

JUNE 2016 - PRESENT

☑ korastak.com

Notes-sharing platform with the goal of democratizing the studying experience for students in Egyptian universities.

NodeJS AngularJS Firebase HTML CSS





Proficient Python, PyTorch, TF, Keras, C++, JS,

NodeJS, C#, Java, SQL, Matlab, HTML, CSS

Prior Exp Swift, Obj-C, F#, Elm, VB, PHP, Verilog, Ruby,

iOS Dev, Android Dev, Windows Phone Dev,

Alexa Dev, Unity, Arduino

P OTHER AWARDS

- > Best Paper Award for the Fine-Grained Hate Speech Detection Shared Task in Arabic.
- > First place in all four categories of the second NADI shared task. '21
- > Dean's list from Fall '14 till Spring '18 The American University in Cairo '14 '18
- > Computer Science Exemplary Student The American University in Cairo '18
- > Highest-GPA Award for Expected to Graduate The American University in Cairo '18
- > Shortlisted in Dell EMC's Graduation Project Competition The American University in Cairo '18
- > Third Place Amazon Innovation Hackathon The American University in Cairo '18
- > Highest-GPA Award for Juniors The American University in Cairo '17
- > Second Prize in Amazon Alexa Hackathon The American University in Cairo '17
- > High Achiever in CS1101 Course The American University in Cairo '15

+ ACTIVITIES AND VOLUNTEERING

- > Speaker at the NeurIPS 2021 Egypt Meetup hosted by LyRise.
- > Gave a talk at the Goldsmiths Computational Cognitive Neuroscience Career Event.
- > Led website development track for the ACL-6060 D&I Initiative.
- > Official Author of Towards Data Science.
- > Volunteered in the organization of the 28th International Conference on Computational Linguistics (COLING'2020).
- > Participated in giving a tutorial on multilingual embeddings at IndabaX'19 Egypt.
- > Participated in several competitive programming contests including Google Hash Code, Facebook Hacker Cup and more. Qualified to ACM ECPC representing AUC, June '15 June '18.
- > Associate Head of the Computer Science and Engineering Association academics. committee at AUC, responsible for organizing academic events and workshops, Spring '17
- > Co-Founded Creative Coding Cairo under FabLab Egypt. Organize monthly meet-ups for the community, Juyl '16 Sep '17.
- > Developed a Database System for Doum Cultural Foundation using MS Access VB and SQL. Managing their website and their digital presence. Volunteer in organizing some of their workshops and cultural events, Cairo, September '12 May '16.
- > Member of the CISV Egyptian delegation. Participated in organizing a summer camp in Paris, June '10.
- > A member of the children jury delegation of long and short films in Cairo International Film Festival for Children; our role was to select a winner for each prize in the film festival, '07, '08, '10.