Address:	3419, Tulane Drive #22 Hyattsville, MD 20783, USA	E-mail: Citizenship:	mgunady@cs.umd.edu Egyptian
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Mohamed Khaled Gunady

Research Interests

- Bioinformatics, Data Science, Machine Learning, Statistical Learning
- Artificial Intelligence, Multi-Agent Systems, Robotics
- Parallel Programming, Data Structures, Algorithms

Education

Ph.D. Computer Science **Sept. 2013 – Present**
University of Maryland – College Park, MD, USA
Concentration: Bioinformatics, Machine Learning, Data Science
Advisor: Hector Corrada Bravo
GPA: 3.88 / 4.0
Relevant Coursework:
- CMSC701 Computational Genomics (Mihai Pop)
- CMSC702 Computational Systems Biology and Functional Genomics (Hector Bravo)
- CMSC724 Database Management Systems (Amol Deshpande)
- CMSC723 Computational Linguistics (Marine Carput)
- CMSC726 Machine Learning (Hal Daume III)
- CMSC828C Statistical Pattern Recognition (Rama Chellappa)

M.Sc. Computer Science **Sept. 2010 – Sept. 2012**
Egypt-Japan University (E-JUST), Egypt
Thesis: Agents Learning to Play Hide-and-Seek Games
Concentration: Machine Learning, Multi-agent Systems
Advisors: Walid Gomaa, Ikuo Takeuchi, Amin Shoukry
GPA: 3.66 / 4.0

B.Sc. Computer Engineering **Sept. 2004 – June 2009**
Faculty of Engineering, University of Alexandria, Egypt
Thesis: General Purpose computing on Graphics Processing Units
Concentration: Parallel Programming, Multi-core and Many-core
Advisors: Ayman Khalafallah, and Amin Shoukry
GPA: 3.79 / 4.0. Ranking in batch: 10 out of 80

Research Experience

University of Maryland – College Park, MD, USA **June 2015 – Present**
Research on Bioinformatics and data analysis at UMD's CBCB.
Including work on transcripts-level and alternative splicing differential expression analysis from RNA-seq data. Our graph-based approach implemented in yanagi uses high throughput lightweight kmer-based alignment to provide count statistics on the local splicing level. This work empowers ultrafast and lightweight alignment approaches to provide segment-based counts for more accurate omnibus analysis of differential splicing, transcript, gene levels. (Python, R, C++)

We also adapted our graph approach in Yanagi to build Whole Genome Population Reference which is significantly important for genotyping highly polymorphic regions of the genome like HLA genes.

Moreover, other work on single-cell RNA-seq data imputation. Using modern generative adversarial models (GANs) into imputing single cell datasets that are typically sparse and noisy. (Tensorflow, Python)

Egypt-Japan University (E-JUST), Egypt **Sept. 2010 – Sept. 2012**
Research on Machine Learning and Multi-Agent Systems for robots locomotion. In particular, how robots learn to play Hide-and-Seek. A novel learning model for multi-seekers to cooperate and divide the seeking territories, in a hierarchical learning model using Reinforcement Learning. The model is enhanced by means of state aggregation for space and time reduction (Curse of Dimensionality).

Faculty of Engineering, University of Alexandria, Egypt **Sept. 2004 – June 2009**
Research on Parallel Programming using multi-core and many-core frameworks using GPUs for general purpose computing (GPGPU) rather than graphics processing only. Data-parallelizable case-studies like Genetic Programming, Image Processing, large-scaled Sorting algorithms & Data Clustering algorithms were studied, modeled, and implemented on GPUs.

Work Experience

Illumina, San Diego, California **May 2017 – July 2017**
Bioinformatics Intern
- Genomic Variants Team: I extended my work in RNA-Seq to apply my graph-based approach (Yanagi) in the area of WGS to efficiently use population reference graphs in linear k-mer based aligners. Experiments on highly polymorphic genomic regions, e.g. HLA genes, showed promising results compared to graph-based aligners.

SAP America Inc., Newtown Square, Pennsylvania **May 2014 – July 2014**
Support Engineer intern, Global Active Support
- Center of Expertise (CoE): center for solving performance problems and availability analysis of complex SAP solutions at premium customer base.

InovaEg., Alexandria, Egypt **Feb. 2013 – Aug. 2013**
Game Developer/Team Leader
- Developing puzzle game for iOS using Cocos2D+Box2D
- Responsibilities: game design, puzzle levels design, code team lead

BadrIT co., Alexandria, Egypt **July 2009 – Sept. 2010**
Software Developer
- In Ruby on Rails (RoR) team:
  - Developed an internal HR system for BadrIT
  - Developed an internal Order Food system for employees in BadrIT
- In iPhone team:
  - Humail: an emotional 3D-like mail client for iPhone
  - iMeasure: a research-oriented application to use the accelerometer in iPhone to measure distances, handling noisy sensory readings

Publications

- **Mohamed Gunady**, Stephen Mount, Hector Bravo, *"Yanagi: Fast and interpretable segment-based alternative splicing and gene expression analysis"* (**BMC Bioinformatics**)
- *Aya Ismail*, **Mohamed Gunady**, *Luiz Pessoa*, Hector Bravo, *Soheil Feizi, "Cell-Attention Reduces Vanishing Saliency of Recurrent Neural Networks"* (**NeurIPS 2019**)
- **Mohamed Gunady**, Hector Bravo, Soheil Feizi, *"scGAIN: Single-Cell Data Imputation using Generative Adversarial Networks"* (**Submitted to RECOMB 2020**)
- **Mohamed Gunady**, Hector Bravo, Sangtae Kim, *" Bridging Linear to Graph-based Alignment with Whole Genome Population Reference Graphs"*, Presentation and Poster (**ISMB 2018**)
- **Mohamed Gunady**, Steffen Cornwell, Stephen Mount, Hector Bravo, *"Yanagi: Transcript Segment Library Construction for RNA-Seq Quantification"*, 17th International Workshop on Algorithms in Bioinformatics (**WABI 2017**)

- **Mohamed Gunady**, Walid Gomaa, Ikuo Takeuchi, *" Aggregate Reinforcement Learning for multi-agent territory division: The Hide-and-Seek game"*, Engineering Applications of Artificial Intelligence, Volume 34, pp 122-136 (2014)
- **Mohamed Gunady**, Walid Gomaa, Ikuo Takeuchi, *"Multi-Agent Task Division Learning in Hide-and-Seek Games"*, 15th AIMSA. Springer-Verlag LNCS, Volume 7557, pp 256-265 (2012)
- **Mohamed Gunady**, Walid Gomaa. *"Reinforcement learning generalization using state aggregation with a maze-solving problem"*, Proceedings of Japan-Egypt Conference on Electronics, Communications and Computers (JEC-ECC), IEEE Xplore, pp. 157–162 (2012)

Teaching Experience

TA, Computer Science Department, University of Maryland – College Park, MD, USA
- CMSC131 Object Oriented Programming I, Java Programming (Fall 2013, Spring 2014)
- CMSC132 Object Oriented Programming II, Data Structures (Fall 2014)
- CMSC423 Bioinformatic Algorithms, Databases, and Tools (Spring 2015)

IT Skills

Data Analysis frameworks:
R/Bioconductor

Programming languages:
C/C++, JAVA, Python, Ruby, Objective-C
SQL, OpenGL, CUDA for GPUs

Mobile development:
Symbian C++, J2ME, Apple iOS

Web development & frameworks:
HTML, XML, CSS, JavaScript, JSON, Ajax
MySQL / SQLite
JSP / Servlets, EJB, PHP, Ruby on Rails (RoR)

Honors and Awards

- Dean's Fellowship Award, University of Maryland **2013-2015**
- Fellowship for M.Sc. degree from Mitsubishi International Corporation, E-JUST **2010-2012**
- Degree of Honor, University of Alexandria, Egypt **2009**
- Bronze Medal in the programming contest of Egyptian Olympiad in Informatics **EOI 2006**

Languages

Arabic: Native Language **English**: Excellent **French** & **Japanese**: Fair

Personal Interests

Drawing, Table Tennis, Watching Anime
Free readings in Psychology, History. Enjoy travelling, open landscapes

* References available upon request.