HAITHAM
ELMARAKEBY

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EDUCATION

2016 (expected) | **Doctor of Philosophy**
Computer Science, Virginia Tech, USA
Dissertation: *Deep Learning for Biological Data.*

2010 | **Master of Science**
Computer Engineering, Cairo University, Egypt
Thesis: *A generalized object detection and localization framework using automatics feature selection.*

2006 | **Graduate Courses**
Computer Engineering, Cairo University, Egypt.

2004 | **Bachelor of Science**
Systems & Computers Engineering, Al-Azhar University, Egypt.
Ranked First on class

RESEARCH INTERESTS

Machine learning, data mining, algorithms, graph theory, bioinformatics, computational biology, system biology.

HONORS/AWARDS

- Ranked 4th in the Broad-DREAM Gene-Essentiality Prediction Challenge 9.0, 2014.
- CS Grad Council grant to attend Machine Learning Summer School (MLSS @ CMU) 2014.
- PhD scholarship award, Higher Education Ministry, Egypt, 2011.
- Young Innovation Award (YIA), Egypt, 2009.
- Honored as first of my class 2001, 2002, 2003, and 2004.
- A member of the winner team of Information League, Egyptian Universities Youth Week, 2003.

EXPEREINCE

Aug. 2011 now | **PhD Research**
Computer Science, Virginia Tech

I have finished my coursework with 12 courses: Data Mining, Convex Optimization, Statistics in Research, Software Engineering, Intro to Artificial Intelligence, Computational Systems Biology, Algorithms in Bioinformatics, Theory of Algorithms, Computational Genomics, Paradigms for Bioinformatics, Data Management of Bioinformatics, Bayesian Statistics (audit). I applied deep learning techniques and kernel methods for biological data to predict how essential a gene is for cancer to survive. I implemented a novel system to classify and name organisms based on genome contents. I developed a system to predict potential targets of human miRNA in Hepatitis C virus genome.

Jan. 2006 Oct. 2011	**Research and Teaching Assistant** (full time) Systems and Computers Dept. , Al-Azhar University As a TA I have taught many courses for undergraduate students including Pattern Recognition & Image Processing, Semantic Web, Artificial Intelligence, Simulation and Modeling, Algorithms & programming languages, Digital Design, and Electronics. I have helped students in labs including AI & software engineering, hardware, and electronics labs. I have monitored students working on graduation projects and helped them overcome difficulties both in theory and implementation. I was selected by students as the best TA in 2010. Note: all other positions are part-time positions.
Jan 2010 March 2012	**Freelancer** https://www.odesk.com/users/~0151c7360de4a28f93 As a freelancer, I have developed many scientific and commercial products for individual and companies. I believe that my applications are still in service in different areas of the world.
Dec 2008 Dec. 2009	**Cisco Academy Instructor** (part time) http://cisco.netacad.net/ Cisco Academy is a collaborative program conducted under the sponsorship of Cisco Systems. As an instructor, I have the pleasure to teach students the basics of networking. It was a nice experience to gain both academic and industrial experience while teaching these courses.
Jun. 2008 Oct. 2009	**Senior Software Engineer** (part time) Horizons Software http://www.horizonssoftware.com Horizons software is a CMMI® level-3 certified company and a Microsoft Golden Partner established in Egypt. Horizons software develops strategy management products and has many clients in the MENA region. As a software engineer, I have analyzed, designed, developed, and tested many modules of Strategy Architect (SA) application using .Net technology according to defined processes at Horizons. I also have finished many research tasks to enhance the application UI, boost its performance, and integrate it with other applications.
Nov 2009 July 2010	**Software Architect** (part time) Horizons Software http://www.horizonssoftware.com As my time at Horizons approached its end, I have been assigned a temporary position as an architect. As a software architect, I had a responsibility to re-architect the SA application to face the new requirements and enhance the maintainability of the existing code. We have developed a pilot project showing that the new architecture along with some design tricks can boost the application performance dramatically.
Aug 2007 Aug 2008	**Network Manager** (part time) Network Manger at Information System and Network Unit (ISNU) AL-Azhar University

I have worked as network manger, leading a team of about 10 members to manage a large network at AL Azhar University HQ. The job was more managerial one than technical.

<table>
<tr><td>Dec. 2004
Dec. 2005</td><td>**Software Engineer** (full time)
Egyptian Army</td></tr>
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For a whole year, I have developed many data intensive application to automate different manual processes going through the whole development cycle, analysis, design, implementation, testing, and training.

PUBLICATIONS

Alexandra J. Weisberg, Haitham Marakeby, Lenwood S. Heath, Boris Vinatzer, Sequentially assigned genome similarity-based isolate names are informative of deep phylogenetic relationships of Ebola virus (EBOV), submitted

Marakeby H, Badr E, Torkey H, Song Y, Leman S, et al. (2014) A System to Automatically Classify and Name Any Individual Genome-Sequenced Organism Independently of Current Biological Classification and Nomenclature. PLoS ONE 9(2)

Fatmaelzahraa Eid, Haitham Elmarakeby, Lenwood S. Heath, and Mahmoud Elhefanwi, "Human MicroRNAs Targeting Hepatitis C Virus" MECBME'14

M. Zaki, Samir Shahin, and Haitham Almarakeby, "Multiple Object Detection and Localization System using Automatic Feature Selection" International Journal of Signal and Imaging Systems Engineering, Accepted

Haitham Elmarakeby, "Generalized Object Detection and Localization System using Automatic Feature Selection", Master thesis, 2010

Haitham Elmarakeby, M. Zaki, and Samir Shahin, "A generalized object detection system using automatic feature selection",
The International Conference on Intelligent Systems Design and Applications (ISAD), Cairo, 2010

UNPUBLISHED WORK

Deep models versus kernel machines: who is the winner?
https://www.synapse.org/#!Synapse:syn2575689

Multilayer Feature Selection Framework for Rheumatoid Arthritis Responder Prediction
https://www.synapse.org/#!Synapse:syn2495282

PROJECTS (selected)

GenomeID

Current biological classification and nomenclature use the species as the basic unit. They are thus inadequate to classify and name the immense genetic diversity within species that has been revealed by genome sequencing. To address this lack of a general intra-species classification and naming system, we propose that genome-sequenced organisms should be assigned codes that are informative of the individual organism's similarity to all other related organisms. We propose a general system on how to assign such genome similarity-based codes. We provide examples demonstrating that

genome similarity-based codes largely align with current taxonomic groups at many different levels in bacteria, animals, humans, plants, and viruses. This research resulted in a submitted journal paper and a conference poster.

Human miRNA targeting HCV genome

MicroRNA (miRNA) is a post-transcriptional gene regulation mechanism that mediates sequence-specific degradation of the targeted RNA and thus provides an opportunity for the development of oligonucleotide-based drugs. Here, we propose a systematic approach for finding, selecting, and validating miRNAs that target conserved regions in the hepatitis C virus (HCV). Different factors, such as target conservation, target accessibility, miRNA and target RNA thermodynamics, are considered in our pipeline. The conservation profiles of six major genotypes of HCV have been analyzed, and the potential conserved regions are selected for downstream analysis based on their entropy and length. An in-silico protocol for predicting the miRNA targets in HCV highly conserved regions is devised, and a set of potential miRNAs is filtered and verified using different techniques. Some of the predicted miRNAs were previously experimentally validated which gives support to our analysis.

Object Detection and Localization System

A generalized object detection and localization system is developed. It has the ability to learn the object model. The feature selection is automated and so is the architecture building by adopting the Adaboost algorithm as a feature selection and meta-learning algorithm. For verifying the multipurpose feature of the system, the proposed framework has been used for detecting two objects of different types, one object is man-made while the other is a natural one. This research resulted in a couple of papers.

Vision Guided Robot

A simple application that detects and recognizes individual Arabic characters which are typed on the sides of blocks. The application also controls the motion of a robot arm that can move blocks from a place to another based on a predefined sequence.

Formant Speech Synthesizer

A complete implementation of speech generator using Klatt Formant Synthesizer, which is based on source-filter-model of speech. The application can generate all English phonemes without using prerecorded speech fragments.

Concatenation Speech Synthesizer

An implementation of Arabic Text To Speech Synthesizer that can speak diactrized Arabic sentences aloud taking into account the Arabic rules of pronunciation.

Speech Signal Watermarking

Some pieces of code which were used to add unheard fragile watermark signal to the original speech signal at the source and detect its presence and its reliability against noise at the receiver.

MRCP Server

Design and implementation of Media Resource Control Protocol (MRCP) server side application which can be used to interface any media engines - e.g. Text To Speech (TTS) or Automated Speech Recognition (ASR) engines- to other MRCP clients.

TEACHING

- Pattern Recognition and Image Processing
- Artificial Intelligence
- Simulation and Modeling
- Algorithms and programming languages
- Digital Design
- Electronics

Labs

- AI & Software Engineering Lab.
- Hardware Lab.
- Electronics Lab.

TECHNICAL SKILS

Programming Languages and packages

Matlab, C, C++, Visual C#.Net, Visual Basic.Net, Java, Pylearn2, Scikit-learn.

Development Tools

Microsoft Visual Studio.Net, Microsoft Visual Studio 6, Eclipse, NetBeans.

Database Management Systems DBMS

Microsoft SQL Server, Microsoft Access.

Web Technologies

HTML, ASP.Net, Silverlight

Others

System Analysis & Design, Network programming and Multithreading.

SOFT SKILLS

- Good research capabilities.
- The ability to learn, and gain new knowledge.
- Working under pressure and with deadlines.
- High skills in teaching, introducing information and transferring knowledge.
- Good presentation skills.
- Good time management and communication skills.

OTHERS

The founder of Domain Driven Design Community in Egypt
http://domaindrivendesign.org/community/local_groups

REFERENCES

- Prof. Lenwood S. Heath
  heath@vt.edu
- Prof. Dr. Mohamed Zaki
  azhar@eun.eg
- Dr. Mahmoud El Hefnawy
  mahef@aucegypt.edu