Proactive Location Intelligence

Position: Summer internship at the Smart Decision Solutions Group.

Project Description: With the pervasive adoption of location aware technologies and other sensors in mobile devices, connected cars, environmental sensors, and other software and hardware architecture, today's smarter systems need to be able to sense, analyze, monitor, predict, and response to space- and time- based situations. Our group aims to advance the state of the art in development of comprehensive set of technologies that facilitate building smart systems than can react, predict and take proactive actions to space-time situations. We apply our technologies for solving realworld client challenges across a wide range of industries such as Travel & Transportation, Logistics, Maritime, Insurance, Natural Resources and Retail. In addition we apply our technologies to address societal challenges in areas such as Smarter Cities, Urban Planning, Urban Mobility, Multimodal Transportation, Environment, Open Data, and Citizen Engagement. We work in close partnership with other business units in IBM to deliver a standards based technological support for the IBM software platform, solution and services businesses.

References: https://www.research.ibm.com/haifa/dept/services/sds.shtml

We Offer: An opportunity to join R&D activities in the world's largest IT research organization.

Required Skills: Good research and self-learning skills, programming skills (primarily in Java) and a passion for innovation that matters.

Full/Part time Position: Summer internship.

Contact details: annabra@il.ibm.com
Summer intern in the field of Medical Imaging

For additional info contact: annabra@il.ibm.com

Position:
Computer Vision student at the Medical Imaging Analytics Group.

Project Description:
The Medical Imaging Analytics Group – part of the Multimedia Analytics department at IBM Research – specializes in advanced image processing technologies. The project scope includes invention and design of new computer vision methods in the field of medical imaging.

Position requirement:
We are looking for researchers in the field of computer vision and machine learning. The position will involve analysis of radiological images and clinical data.

We offer:
An opportunity to collaborate and publish with top researchers at IBM Research in the area of medical image processing, on a topic that is on the cutting edge of research and technology.

Required Skills:
The position is intended for MSc or PhD students in Computer Mathematics with focus on computer vision, machine Science/Electrical Engineering/learning or image-processing. Research capabilities, with strong theory/algorithm background and very good understanding on how to apply advanced knowledge to solve real problems. Fluent in MATLAB. Industry experience is an advantage.

Full/Part time Position: Summer internship.

Contact details: annabra@il.ibm.com
Machine Learning Research

Company:
IBM Watson, Haifa Research Lab

General Background:
In our team, we develop unique capabilities that are aimed at assisting users in making decisions. We use a variety of methods, from optimization to machine learning, in order to help people pick the best alternative, whether it is a product or a course of action.

Position:
Student Researcher

Project Description:
We offer two research projects in AI/machine learning. The projects require devising and developing new machine learning algorithms for the recommendation of a small number of options to the user out of a large pool. In these projects, we would like to exploit unique information arising from the interaction of the user with a computerized decision assistant, in order to provide state-of-the-art user-targeted recommendations in a variety of domains (i.e., projects are not tied to a particular data corpus / domain).

1. Project A: Using reinforcement learning in order to devise a recommendation system that learns and improves in the coarse of time by exploring possible interactions with the user.
2. Project B: Using text analytics and collaborative filtering with textual artifacts in order to provide recommendations in an online setting.

The projects also require implementing new ideas using Python and its scientific libraries, or other data mining software.

We offer:
We offer two exploratory research projects possibly leading to scientific publications, in addition to participating in developing novel solutions with a clear productization roadmap.

Skills:
• Strong analytical skills
• Independent, self-learner
  • Background in mathematics / computer science / mathematical sciences
  • Proficiency and hands-on experience in machine learning
  • Project A: Background in reinforcement learning is a significant advantage

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• **Project B:** Background in text analytics, NLP, or collaborative filtering is an advantage

**Full/Part time Position:**
Full-time student position for the summer period

**Contact details:** annabra@il.ibm.com
Summer Internship- Debating Technologies

For additional info contact: annabra@il.ibm.com

General Background:
In 2006 a team of researchers in IBM took upon themselves the challenge of developing a fully automatic system that will compete in the popular quiz show Jeopardy! It took them over 5 years and in 2011 the system, which was named Watson, participated in a live Jeopardy! Show competing against the all times champions. Watson won the game while demonstrating unprecedented text analytics capabilities. Since this event, IBM has been building on this technology to open new business directions for the company. At the same time researchers at IBM asked themselves what would be the next challenges for Watson.

Project description:
While Watson demonstrated impressive text analytics, it is still confined to answer factual questions where typically there is a right or wrong answer. However, most of the questions that we ask in life are more complex and are influenced by biases and different points if view. For example: "Should we ban smoking?", "Should I rent an apartment or buy one?", "Should IBM make a partnership with Apple?". IBM Debating Technologies is a project which aims to address such scenarios. At a very high level, we are developing a system and a set of tools, which will assist humans in situations where debate and reasoning is required. The system, given a topic under dispute, generates arguments which either support or contest the topic. A demonstration of initial capabilities can be seen here (starting around minute 45):
https://www.youtube.com/watch?feature=player_embedded&v=6fJOtAzICzw

We offer:
An opportunity to be part of an interdisciplinary, global team, working on a cutting edge technology which is highly exploratory.

Skills:
- Proven background in natural language processing and/or machine learning
- Programming experience in Java is an advantage.

Full/Part time Position: Summer internship.
Title of the project: Detection of Sensitive Data Exposure in Web Applications

Job description: Many web applications do not properly protect sensitive data, such as credit cards, tax IDs, and authentication credentials. Attackers may steal or modify such weakly protected data to conduct credit card fraud, identity theft, or other crimes. To tackle this problem we developed a tool that monitors http traffic and identifies sensitive information within the traffic. The next step is to apply various Machine Learning techniques on sensitive data extracted from the http traffic to identify potential data exposure. With this being said, the project goal is to implement several Machine Learning algorithms developed at HRL (or develop your own) and evaluate them on the predefined set of Web Applications.

We offer exploratory research project leading to developing a novel solution with a clear productization roadmap. Student will be exposed to cutting-edge machine learning algorithms, and will need to adopt them to address project’s needs.

Required skills: Good research, programming (Java) and self-learning skills

Full/part time position: Summer Internship

Contact details: annabra@il.ibm.com
IBM Cybersecurity Center of Excellence in Ben-Gurion University

Position (title of the project): Analysis of System Security

Job description: Engage, under supervision of IBM researchers, in security analysis of complex systems, with the goals of (1) identifying how sophisticated attackers might exploit their vulnerabilities in intricate ways and modify their intended behavior, and (2) developing countermeasures to prevent/isolate the limit the effect of those exploits.

Required skills:

1. Excellent programming skills.
2. Prior experience in computer security.
3. Hands-on experience with static/dynamic code analysis and debugging tools.
4. Expertise in reverse engineering and malware analysis is an advantage.
5. Excellent interpersonal, written, and verbal communication skills.

Full/part time position: Summer Internship position - full time for 3-4 months.

Contact details: annabra@il.ibm.com
blueSecure – Cloud enablement for Application Security

Job description:

In this research we extend Open Source Platform-as-a-Service (Cloud Foundry) by introducing a newly innovated layer of security in which the cloud platform enhances the security of hosted applications.

This is a unique opportunity to get hands on with current and future cloud technologies and consider security aspects of such clouds. As part of this new project, there are a number of research opportunities related to areas of:

1. Systems research
2. Security research

Required skills:

Ability to cope with an abstract challenge and bring together an actual result as a prototype. Experience with Linux and coding skills are required.
Spoken Language: JS, Python and/or Ruby.

Full/part time position: Full Time

Contact details: annabra@il.ibm.com

Haifa University Campus - Mount Carmel, Haifa 31905, Israel
Computer Vision

Position: Researcher in the Video and GIS Analytics group

Project Description:

The Video and GIS Analytics group – part of the Multimedia Analytics department at IBM Research – specializes in advanced real-time video technologies. This unique group focuses on novel approaches for information overload and technologies in the areas of real-time rich-content streaming and management, video communication frameworks and geo-spatial situational awareness. The group develops a scalable framework for real-time connectivity, as well as a platform for off-line rich-media tagging search & retrieval of archived rich media assets.

In the area of video analytics, our group conducts research and develops novel computer vision algorithms (also using machine learning tools) for various problems such as scene text detection and recognition in natural videos and images, video segmentation, visual recognition and scene understanding.

The goal of the project is to develop and implement novel algorithms for solving various computer vision problems related to video (such as the ones mentioned above), with a special emphasis on robustness and efficiency.

We Offer:

An opportunity to work and conduct high-quality research with a leading research group in the area of video analytics and computer vision, on a topic that is on the cutting edge of research and technology.

Required Skills: Graduate student (preferable) with good research and self-learning skills, as well as with some background in image and video processing and deep learning, and preferably also in computer vision and machine learning. Good programming skills in MATLAB and C++ are also required (prior acquaintance with OpenCV is a plus).

Full/Part time Position: Summer internship  Contact details: annabra@il.ibm.com

Haifa University Campus - Mount Carmel, Haifa 31905, Israel
Summer Intern at the Smart Client Platforms group, in the Mobile Enterprise Platforms domain.

**Project Description:**

**Enterprise mobility** is about mobilizing the business organization. It involves the provisioning of tools, resources, and processes by the organization to allow its employees to effectively perform their tasks while on the road or away from their workstations. Typically, this involves an extension of business applications/solutions through the use of portable and mobile devices.

**Mobile Enterprise Platforms** deal with the technical capability to create, deploy and manage suite of enterprise apps to multiple, heterogeneous devices (iOS, Android, RIM) that connect securely to enterprise backend servers.

The Smart Client Platforms group specializes in the study and development of tools and platforms for developing, deploying, managing and analyzing enterprise applications using cutting edge Web 2.0, mobile and cloud technologies as well as advanced code analysis algorithms. The platforms we develop target skilled developers as well as knowledge workers and highlight operation simplicity, consumability, scalability, excellent user experience, while supporting high end security standards.

The intern will be exposed to frontend and backend technologies such as Ajax, REST APIs, JS, JSON, Swift and more.

**We offer:**

An opportunity to work and conduct high-quality research with a leading research group in the area of Mobile Enterprise Platforms on a topic that is on the cutting edge of research and the technology arena.

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**Haifa University Campus - Mount Carmel, Haifa 31905, Israel**
**Required Skills:**

Good research and self-learning skills, excellent programming skills including knowledge of Mobile Platforms, Web technologies.

Full/Part time Position: Summer internship

**Contact details:** annabra@il.ibm.com
Advanced human-centric insight elicitation from wearable indicators

For graduate students / undergraduate students: Graduate students.

Job description:

Wearable wristbands and smart watches, such as Fitbit, Misfit, Apple-Watch, and the Microsoft Band, are nowadays commonly used to guide personal training and fitness tracking. However, there are many additional indicators already provided by these devices that may provide many additional valuable insights regarding users’ behavior, gestures, and even their emotional and mental state. The proposed research project will focus on the derivation of such concrete insights, leveraging upon wearable originated raw data, utilizing a combination of inertial and physiological sensing, such as accelerometer, heart rate (variability), and galvanic skin response. The work will aim to first review the existing body of work in the literature per some pre-determined phenomenon of interest (e.g., fatigue, feelings, gestures, stress), and then employ relevant analytical techniques (i.e., deep machine learning and related probabilistic models) to determine recognition suitability for the desired insights.

Requirements:

The project may be most appealing to students who are interested or who are already engaged in pursuing research that employs machine-learning/data/process-probabilistic models for the purpose of advancing human-centric applications. The intended work in this project will start with a survey of the most prominent techniques currently employed in the context of the pre-determined phenomenon of interest, followed by the development of core analytics for its recognition. This work will lead to developing a proof-of-concept implementation, to be tested empirically in our lab to assess the quality of the developed method with real human participants. The scientific work will be supervised by lead scientists in HRL, and will be planned with an aim to publish an article in a top venue. Full/part time position: a full term summer internship

Contact details: annabra@il.ibm.com

Haifa University Campus - Mount Carmel, Haifa 31905, Israel
Open source developer and researcher

Position (title of the project):

Open source developer and researcher in the OpenStack Storlets project and its echo system. The OpenStack Storlets project an emerging cloud computation framework that co-locates compute and storage in the same system, utilizing state-of-the-art Linux containers technology. Amongst other things the technology facilitates optimizing big data analytics workloads.

Job description: The work include experimenting with new open source tools and technologies, and state of the art devops practices. Depending on interest and skills there is a variety of possibilities to take part in the project. Some examples are:

1. Working on the underlying storlets engine. This work is done in python, java and C, involves learning how to work in the OpenStack open source community, interfaces with Docker containers and OpenStack Swift object store.
2. Working on the analytics echo system. This work involves getting into Spark the bleeding edge of analytics engines, improving on some of its internals to optimize analytics workloads using Storlets.
3. Enhancing development tools such as Eclipse plugins enriching the Storlets echo system.

Required skills: High self-learning skills, passion for open source, good attitude

Full/part time position: full time, 3 months summer Internship.

Contact details: annabra@il.ibm.com

Haifa University Campus - Mount Carmel, Haifa 31905, Israel
Company: IBM Research

Frameworks for elastic balancing of network and data

Job description:

The cloud offers scale, elasticity and diversity for running applications. In this project we aim to explore applicability of techniques from Software Defined Networking to cloud based data stores. The project goal is to identify and develop frameworks for dynamic data stores running on the cloud. The project includes leveraging open source technologies and tools for load balancing, elasticity, Docker containers, distributed state and compute, and data mobility. The development will be done using open source tools and cloud development methods.

Required skills: Experience with the Linux operating system, good understanding of networking concepts, scripting (python, etc), self-learning skills.

Full/part time position: Full-time, 3 months internship

Contact details: annabra@il.ibm.com
**Company:** IBM – Haifa Research Lab

**Position (title of the project):** Enterprise BlockChain

**Job description:** Block Chain technology has made its first appearance on the main stage in crypto currencies, most notably bitcoin. Lately it has caught the attention of many sectors, as a technology enabler by itself detached from its crypto currency heritage. A technology that can be helpful in many additional sectors by forming an infrastructure for distributed trust-less data store and multi-party transactions execution and verification.

The block chain is comprised of several distinct technologies, chief among them, communication, consensus, data storage, and smart contracts. All these need to exhibit high scalability, security all along the way, and need to collaborate to fill a complete holistic puzzle.

We are specifically interested in devising a block chain for an enterprise environment, in which some of the underlying assumptions are different than in cryptocurrency systems. Thus, we are interested in taking as a starting point existing open source components and augment them with required capabilities based on enterprise requirements.

The intern will be exposed to scalable backend technologies such as cloud, P2P communication, scalable consensus mechanisms for replication, and more.

We offer an opportunity to work and conduct high-quality research with a leading research group in the area of scalable distributed middleware, on a topic that is on the cutting edge of research and the technology arena.

**Required skills:** Good research and self-learning skills, excellent programming skills including knowledge of distributed systems.

**Full/part time position:** Summer internship.

**Contact details:** annabra@il.ibm.com
Company:

IBM Research Haifa

Position (title of the project):

**Highly available mission-critical cloud services**

Job description:

General Background:

The Cloud and Distributed Middleware group at IBM Research Haifa works at the cutting edge of applied distributed systems research. We bring distributed systems expertise to IBM’s cloud computing assets and develop novel approaches to tackle real-world problems.

Project Description:

Our goal is to facilitate the management of large numbers of mission-critical services that are depended upon by customer-facing services on the cloud. In particular, we investigate novel techniques to improve the availability characteristics of such systems through automation and data-driven engineering exploiting the large volume of data we can measure about their operation. This project is at the intersection of machine learning applied to challenges that arise in the management of modern distributed systems. We perform applied / hands-on research by turning our ideas into code / systems and evaluating them in the context of real-world production cloud services.

We offer:

We offer an opportunity to work on technical problems as they occur in real-world, large-scale cloud computing systems, solutions to which promise to have significant impact and may lead to a peer-reviewed publication in a top-tier conference.

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**Required skills:**

PhD candidate from CS (or strong MSc student in advanced stages of her studies).

Knowledge and preferably research experience in either machine learning and/or distributed systems.

Experience with software development in a Linux environment desirable (Java, BASH, python). Basic knowledge of cloud computing concepts (microservices, service discovery, distributed coordination, load balancers, block storage services, and so on) are a plus.

**Full/part time position:**

Full-time student position for the summer period.

**Contact details:** annabra@il.ibm.com
**Company:** IBM Research – Haifa labs

**Position (title of the project):** Researcher – Information Retrieval group

**Project title:** Dynamic information retrieval

**Job description:** Dynamic information retrieval is a new emerging field of cognitive IR aiming at better satisfaction of user’s information retrieval needs based on user’s interactions with the search system. During the project we shall develop novel dynamic IR techniques that would allow to capture diverse user information seeking intents and tasks, model user’s cognitive IR states and response to user interactions (e.g., clicks, query formulations, dwell-times, etc.) so to improve the overall search quality. An outcome of such project should be a research paper targeted to one of the top-tier IR conferences.

For more details please see: [http://www.slideshare.net/marcCsloan/dynamic-information-retrieval-tutorial](http://www.slideshare.net/marcCsloan/dynamic-information-retrieval-tutorial)

**Required skills:**

- Phd or Master level student in CS, EE or IS.
- Good programming skills (Java/Python preferred).
- Background in machine learning with high preference to prior knowledge in reinforcement learning – MDPs.
- Prior knowledge with state-of-the-art ML and IR tools is a plus.

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• Basic knowledge in Information Retrieval (with preference to prior knowledge in advanced retrieval models or recommender systems).

**Full/part time position:** Full time student position for the summer period in the Haifa area.

**Contact details:** annabra@il.ibm.com
Expressive speech: parameterization & transformation

For additional info contact: annabra@il.ibm.com

General Background:
One of the key challenges in human computer voice interaction systems is the ability to manipulate synthesized speech, so that it can convey desired expressiveness and affect, while preserving high speech quality. The affect in speech is expressed by its prosodic characteristics (pitch, duration & energy) as well as by other speech manipulations (e.g. spectral envelope modification/ breathiness modification, etc.). Existing prosody modification techniques usually makes a simplistic assumption of spectral envelope preservation when modifying the prosody, while emotion modification is mostly based on prosody modification and to a lesser extent on some rule based spectral modifications.

Project Description:
We would like to explore data-driven approaches for prosody and emotion modification of speech (in parametric domain), provided a labeled and clustered emotional speech data corpus. We will start from prosody and emotion manipulation on natural prerecorded speech (e.g., part of the given labeled single speaker data corpus), and later move to synthesized speech manipulation.

We offer:
We offer an opportunity to work on an exploratory research project possibly leading to a scientific publication. Large data corpus will be provided for the research.

Skills:
- PhD candidate from EE or CS (or strong MSc student in advanced stages of his Master).
- Knowledge and Research Experience in Speech/Signal processing.
- Background in Speech Synthesis is an advantage.

Full/Part time Position: Full time student position for the summer period in the Haifa area.

Please apply on line- https://www.research.ibm.com/haifa/careers.shtml

Haifa University Campus - Mount Carmel, Haifa 31905, Israel
Multi-Modal Biometric Authentication

For additional info contact: annabra@il.ibm.com

General Background:
Multi-Modal Biometric authentication is the verification of a user’s identity by means of its physical traits or behavioral characteristics that cannot be changed easily, such as a voice, face, handwriting and fingerprints. Mutli-Modal Biometrics enables secure, robust and convenient authentication which is not available using only a single modality.

Project Description:
We would like to explore innovative approaches to improve the robustness and accuracy of our biometric engines and detection of spoofing attacks (user liveness detection). One such approach is the usage of Deep Neural Networks and an additional possible direction is to explore synchronous analysis of voice and the video live input in order to improve accuracy, robustness and liveness detection.

We offer:
We offer the opportunity to work on an exploratory research project possibly leading to a scientific publication in addition to contributing to the development of a novel mobile authentication solution.

Skills:
- PhD candidate from EE or CS (or strong MSc student in advanced stages of his Master).
- Knowledge and Research Experience in machine learning and either computer vision or speech/signal processing.
- Background in biometric identification or authentication is an advantage.

Full/Part time Position: Full time student position for the summer period in the Tel-Aviv area (preferred) or Haifa area (possible).

Please apply on line- https://www.research.ibm.com/haifa/careers.shtml

Haifa University Campus - Mount Carmel, Haifa 31905, Israel
Expressive speech: Speech based Emotion Detection

For additional info contact: annabra@il.ibm.com

General Background:
Affective Computing is the study and development of systems and devices that can recognize, interpret, process, and simulate human affects (emotions, mood and feelings). Detecting and monitoring emotions in speech using its non-verbal content is a key technology in affective computing and affect aware conversational systems.

Project Description:
Our goal is to use innovative Deep Learning and other machine learning techniques, combined with state of the art speech signal processing algorithms, to develop technology for emotion detection from speech, based on semi-supervised learning. In particular, we are interested in learning from large scale emotional speech recordings, where extensive labeling is impractical, and therefore we need to use the data under the assumption that only a small portion of it would be labeled.

We offer:
We offer the opportunity to work on an exploratory research project possibly leading to a scientific publication.

Skills:
- PhD candidate from EE or CS (or strong MSc student in advanced stages of his Master).
- Knowledge and Research Experience in speech/signal processing and/or machine learning.
- Experience in software development in Windows environment.

Full/Part time Position: Full time student position for the summer period in the Haifa area.

Please apply online: https://www.research.ibm.com/haifa/careers.shtml
Why an internship at IBM Research?

- Top-notch researchers in the area of Cognitive Computing
- Work globally with researchers around the world
- Get the taste and opportunities of a large corporate
Representing sentences in natural language has been a topic of interest in the natural language processing community for a long time. The need for a robust mechanism that supports sentence embedding is of high importance. Applications such as question-answering, paraphrase analysis, pro-con analysis, textual entailment, plagiarism, and the like could benefit greatly from this kind of functionality.

The goal in this project is to create a robust general model for sentence representation that will take into account both word semantics and sentence structure, by learning an unsupervised model at the sentence level. We work on applying our methodology on tasks such as textual entailment and pro-con analysis in addition to exploring different architecture components and integration of a supervised loss function together with the unsupervised one.

DO YOU FIT?

We are looking for talented and motivated graduate students who will examine new directions for this project, specifically in the domain of word embedding and neural networks. One possible direction is to enrich the data set by creating paraphrases of the questions.

Join in -

- If you are a computer science or engineering PhD/MSc student
- If you master programming languages – Matlab / R / Python / Java
- If you have background in NLP and deep learning
- If you are creative and ready for hard work in a pleasant environment

3-4 months of a PhD / MSc student during the summer
- Computer Science / Engineering
- Project involves research and development of methods in cognitive computing and machine learning and applying them to real world data.
- An option for submitting the work as a paper in the weeks following the internship
- Get to know IBM’s recent tools such as BlueMix

For more information:
Anna Bar-Yehuda
annabra@il.ibm.com