## Summer Internships 2017

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LogicBlox

Data Quality Management for Machine Learning

Company: LogicBlox

Full/part time position: Full.

Location: 1349 West Peachtree St NW, Atlanta, GA 30309 (LogicBlox headquarters)

LogicBlox will support an appropriate visa application. Assuming visa is granted, LogicBlox will provide salary, travel expenses and living accommodations.

Contact details: Dr. Nikolaos Vasiloglou, nikolaos.vasiloglou@logicblox.com

Position (title of the project): DQM for Machine Learning

Job description: This internship will focus on designing and building tools for Data Quality Management (DQM) in the context of machine learning.

Detailed description: The abundance of Big Data resources opens up unprecedented opportunities for Machine Learning (ML) applications, towards a variety of tasks such as automation of processes (Artificial Intelligence) and predictive analysis (e.g., demand forecasting and disease prediction). However, such data comes with significant challenges to ML libraries. One of the greatest challenges is that of controlling the quality of data. Low data quality has several basic reasons in the context of Big Data. Repositories are often collected from sources with limited content control, and they undergo nontrivial automated processing before being served to the ML library at hand. For example, data may be integrated from resources that disagree on formats, or contain overlapping information. Data may be generated via imprecise methods such as signal analysis, image recognition, and natural language processing. And data may undergo transformations that fail on certain values or character encodings.

While low data quality is an old problem, the high volumes processed nowadays often make it impossible to detect and correct errors. In fact, one typically observes the errors only when the ML library mal-behaves. The easy case is when exceptions are thrown. The hard case is when the learned prediction model behaves in an unintuitive manner (e.g., reducing the price of a product leads to reduction of sales). You will develop tools for dramatically facilitating the control of data quality in the context of machine learning applications. In particular, the tool will focus on the management of large volumes of training data, and will serve two main functionalities: (1) visualizing relevant statistics, (2) expressing the testing for expected integrity constraints (e.g., lower price leads to more sales).
**Required skills:** Programming in C++. Advantage: background in ML, background in Web programming.

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**LogicBlox**

**Declarative Deep Learning**

**Company:** LogicBlox

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

**Location:** 1349 West Peachtree St NW, Atlanta, GA 30309 (LogicBlox headquarters)

LogicBlox will support an appropriate visa application. Assuming visa is granted, LogicBlox will provide salary, travel expenses and living accommodations.

**Contact details:** Dr. Nikolaos Vasiloglou, nikolaos.vasiloglou@logicblox.com

**Position (title of the project):** A Declarative System for Engineering Deep Learning

LogicBlox will support an appropriate visa application. Assuming visa is granted, LogicBlox will provide salary, travel expenses and living accommodations.

**Job description:** Deep Learning (DL) is among the topics that arouse the most excitement in the data-science and computer-science communities nowadays. The major benefit of DL is the ability to learn complex functions from a highly rich space of computations (neural networks). Consequently, DL is able to operate over basic, low-level details of information (raw features), and allows to avoid the tedious (and domain-specific) challenge of feature engineering. DL has been so far successful in a handful of domains, such as image recognition and natural language processing, where labeled data is abundant due to modern social and technological trends. Moreover, modern hardware design, such as the GPU family, allow to conduct the heavy computation that DL training entails.

Engineering a task-specific solution using DL technologies requires expertise in neural networks, mastery of specialized libraries for linear algebra such as Signa and TensorFlow, and the transformation of data from the semantic database (e.g., people, reviews, words) into the algebraic representations of the libraries. The goal of this project is to drastically reduce the amount of engineering and the level of expertise required for building DL applications. In particular, in the project you will build the language and translation component for constructing neural networks over a logic-based database, namely LogicBlox (www.logicblox.com). As a result, developers will be presented with a uniform language for representing the database, query the data for raw features, building the network, and using the trained model for prediction.

PTC

Quad mesh generation

Company: PTC

Position (title of the project): Quad mesh generation

Job description: Implementation of different aspects of quad-meshing algorithm

Required skills: Strong C/C++ programming skills, knowledge in Computer Graphics, advantage – Subdivision Surfaces and quad meshing

Full/part time position: Summer internship for MSc or PhD Math student.

Contact details: Michael Shtein (mshtein@ptc.com)

PTC

Ascertain the effectiveness of new Mathcad symbolic computation engine

Company: PTC

Position (title of the project): Ascertain the effectiveness of new Mathcad symbolic computation engine

Job description: Test a new symbolic computation engine from user perspective, find information on how to handle edge cases, have a say in how we prioritize our work!

Required skills:
- Demonstrate in-depth understanding of symbolic functions such as Bessel, Hypergeometric, Matrix decompositions, ...
- Ability and interest in analyzing detailed results for specific functions, matched by higher level vision of what a user of symbolic computation would pay most attention to.

Full/part time position: Summer internship for MSc or PhD Math student.

Contact details: Igal Galkin igalkin@ptc.com
Outbrain

Outbrain 2017 Summer Internship Program

**Company:** Outbrain Inc., the Web’s leading content discovery platform, is seeking outstanding candidates for its 2017 summer internship program. The position entails working in Outbrain’s Recommendation Group, the algorithmic core of a global service that reaches hundreds of millions of unique users per month, serving them hundreds of billions of content recommendations. You will engage in cutting-edge big data technology - and push it forward

**Potential Projects:** the project titles below, while perhaps opaque, should give a general idea of the type of problems interns should expect to tackle at Outbrain:

- Leveraging users’ interest graphs for personalized content recommendation.
- Contextual predictive modeling of users’ interaction with content.
- Predicting users’ post-click engagement with recommendations’ landing pages.
- Adapting collaborative filtering technique to response prediction frameworks.
- Optimization of auction mechanism.

**Position requirements:**

- Currently enrolled as a graduate student in Computer Science or a related discipline.
- Performing research in one of the following fields: machine learning, data mining, natural language processing, algorithmic game theory, mechanism design, information retrieval and statistics.
- Strong coding capabilities in Java and/or Scala and/or Python.
- Industrial experience is an advantage.
- Publication record is an advantage.
- Familiarity with Big Data platforms (e.g. Hadoop, Storm, Spark) is an advantage.

Experience in analyzing large and complex data sets is an advantage.

**Position length and location:** the 3-months long full-time internship will be performed at Outbrain’s offices in Netanya.

**To apply:** please send your CV to rlempel@outbrain.com. Interviews will take place in March 2017
Rafael

Junior member of Cyber Security team

Company: Rafael

Position (title of the project): Junior member of Cyber Security team

For graduate students / undergraduate students: graduate students or undergraduates in the final stages of their studies

Job description: Industrial Computing Systems (ICSs) are at the heart of strategic and critical systems such as power plants, chemical manufacturing, etc. Programmable Logic Controllers (PLCs) are the layer that bridges between the logic and the hardware, meaning they are the first link to connect the physical world with the logical dimension. This puts them at major risk of a cyber attack. Compromised PLCs can cause major ICS failure with safety implications.

Our team develops ICS systems for critical facilities. One of our R&D efforts is securing these systems. We offer a great opportunity to take part in the implementation of software infrastructures as a part of an academic research focused on the architecture and design of PLC security modules.

Requirements: C, CPP, python, relevant theoretical knowledge in PLC architecture and cyber security is optional.

Full/part time position: full time

Contact details: korenk@rafael.co.il

Rafael

Junior member of data science team

Company: Rafael

Position (title of the project): Junior member of data science team

For graduate students / undergraduate students: graduate students or undergraduates in the final stages of their studies
Job description: Implementation of data science infrastructure used for R&D in Rafael. The position will include implementing modules of the infrastructure along-side practical algorithmic research and implementation (for suitable candidates).

Requirements: python, relevant theoretical knowledge (e.g. Machine learning, statistics, data analysis), practical experience (python, elastic search).

Full/part time position: full time

Contact details: korenk@rafael.com

IBM:

Scalable Middleware for Hyperledger blockchain dissemination

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: Blockchain is emerging technology at the heart of crypto currency exchange world, it is powerful and decentralized technology that is revolutionizing the way applications could establish trust, accountability and transparency. Blockchain facilitates security by its design and serves as an example of distributed system with high byzantine fault tolerance. This makes blockchains suitable for the recording of events, title, health care information, identity management, financial transactions and proving provenance.

Our group actively contributing to Hyperledger Fabric project, providing an efficient data dissemination and synchronization middleware allowing scalable communication between all various nodes in the hyperledger network, taking into consideration a Byzantine environment. The data dissemination mechanism proposed is mostly for ledger management with the goal of having all ledger holders to have identical copies of the entire ledger. Our direction is design novel gossip based peer to peer byzantine tolerant communication.

We offer an opportunity to work on cutting edge technical problems (with special focus on byzantine tolerance domain), explore research which promise to have significant impact and may lead to a peer-reviewed publication in a top-tier conferences and contribute to open source community.

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

Knowledge and preferably research experience in distributed algorithms and systems, crypto currency or security. Experience with software development in a Linux environment.
desirable (Java, Go). Basic knowledge of cloud computing concepts (microservices, distributed datastructures, coordination, load balancers, container aka docker) are a plus.

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

**Contact Details:** Michalsh@il.ibm.com

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**IBM:**

**Summer Intern at Cloud Architectures and Networking group, working on Cloud-Scale Load-Balancing**

A Load-Balancer (LB) is a fundamental network component for scalable service architectures that dispatches client requests among multiple service nodes. In cloud scale applications, the rate of client requests arrival might be very high; and, since all requests go through the LB, designing a SW-based LB that can handle the load is a real challenge. The goal of this internship is to investigate a novel advanced ultra-scalable LB design idea and show its feasibility and value through concrete design, implementation, and analysis. The outcome of this research has practical implications and can be integrated into our group’s efforts in this domain (including our open source contributions). This is an opportunity to combine advanced algorithmic ideas with good engineering to solve a real-life problem.

We offer the opportunity to work with our Cloud Networking team of researchers on state-of-the-art practical technologies. This is an exploratory research project with the expected outcomes of a scientific publication, as well as a proof-of-concept for future solutions.

**Required skills** MSC/PHD student with good research and self-learning skills, programming skills (primarily in C and python), and background in networking and distributed algorithms.

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

**Contact Details:** Michalsh@il.ibm.com
IBM:

Summer Intern at Cloud Architectures and Networking group, researching cloud services interaction from social networks perspective

Cloud scale data centers run multitude of applications and services that belong to different tenants, are composed of multiple communicating components, and have very dynamic behaviors. Moreover, these applications and services interact with each other, sometimes in an ad-hoc manner, as service clients discover service providers on the fly. The goal of this research is to investigate service-to-service communication patterns, from social networks perspective, with a goal to discover patterns and trends and bring about useful insights to service creators and operators, as well as to cloud providers and operators. This research will involve data collection, analysis, and visualization, and, if successful, will result both in practical addition to operational analytics toolset we develop and in joint scientific publication. This is an opportunity to take part in an exploratory research, to raise questions and seek answers for them, under supervision and guidance of seasoned Cloud Networking researchers.

**Required skills:** MSC/PHD student with good research and self-learning skills, programming skills, and background in computer networking, social networks, and data analytics.

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

**Contact Details:** Michalsh@il.ibm.com
Conversational information retrieval is a new emerging field of cognitive IR where users interact with the search system through a natural language dialog.

During the project, we shall develop novel conversational IR techniques that will allow to capture diverse user intents and tasks, model user’s cognitive IR states and respond to user interactions (e.g., clicks, query formulations, dwell-times, etc.).

We shall further explore various communication act strategies for a cognitive IR agent for optimal interaction with human users during IR-driven dialogs.

An outcome of such project should be a research paper targeted to one of the toptier IR/AI conferences (e.g., SIGIR, CIKM, WWW, AAAI, IJCAI, et.).

Required skills:

• Phd or Master level student in CS, EE or IS.

• Good programming skills (Java preferred).

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

• Prior knowledge with state-of-the-art IR, ML or AI tools is a plus.

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

**Contact Details:** Michalsh@il.ibm.com
Enhancing Recommender Systems using Textual Reviews

Very recently a plethora of works has been published in the topic of improving recommender systems using user generated textual reviews. The intuition is the unstructured data accompanying the usage history of the users may assist in understanding the users’ preferences and the items’ traits. Thus, we want to employ deep learning techniques to cope with this challenging task.

Job description:

During the internship, you will participate in designing and building a deep learning model for the task of recommender system using textual reviews. The research involves NLP capabilities to understand the feedback users expressed in item reviews, along with collaborative filtering to analyze usage patterns. The desired outcome of this internship is a paper submitted to one of the top tier conferences in the field.

Required skills:

Must:

- MSc or PhD student in Computer Sciences/Engineering.
- Proven knowledge and hands-on experience in deep earning.
- Strong analytical skills and creative thinking.

Advantages:

- Experience with TensorFlow.
- Background in Recommender Systems and NLP

Full/part time position: Summer internship.

Contact Details: Michalsh@il.ibm.com
IBM:

Research Student – Learning to synthesize realistic (big) data for training Deep Learning algorithms

Our Cognitive Vision and Augmented Reality (CVAR) team conducts CV and AR research for industrial applications, such as field technician support, specializing in Machine Vision, Deep Learning, and 3D Vision fields. The current methods of choice for solving Object Detection, Recognition and Analysis problems in images and videos are based on deep Convolutional Neural Networks (CNNs), which in turn require massive amounts of real annotated examples to train effectively. Although other methods exist that allow somewhat reducing the training costs of CNNs, in this work we would like to take the data synthesis approach – learn a generative model for the visual data of interest and use it to train CNNs that would be competitive in performance to ones trained using massive amounts of real data. Developing an effective method such as described will allow us not only to overcome the annotated data requirement limitation, but also to improve performance of the various existing data augmentation techniques increasing accuracy in cases when sufficient training data is available.

Required skills:

- Strong analytical skills
- MSC/PHD students
- Independent, self-learner
- Background in Computer Vision and Deep Learning  
  o (proven record in DL – advantage)
- Programming experience in Matlab  
  o (programming experience in C++ – advantage)
- Familiarity with at least one of the common DL platforms:  
  Caffe / Tensorflow / Torch / Matconvnet  
  o (familiarity with Caffe – advantage)

Full/part time position: Summer internship.

Contact Details: Michalsh@il.ibm.com
Understanding a natural language sentence often requires access to various external knowledge since the text itself contains limited information. When people read a sentence, they use knowledge they acquired during their life or access external resources on the spot in case they lack it to better understand the text.

Neural networks that are trained to analyze natural language sentences usually get labeled data for a given predefined task. Labeled data are usually limited in size and consist of limited domain knowledge related information. Current state-of-the-art neural network models have limited ability to access external knowledge in order to obtain the missing information. In this project, we are bridging this gap by solving two main challenges. The first challenge is to embed a knowledge base into the neural network so that the knowledge base representation will be smoothly integrated by the learning algorithm in any neural network architectures.

The second challenge is to define an interface between an existing knowledge base and neural network architecture. In this challenge, we address interesting questions such as: How does a neural network use the knowledge? What are the forms of access to the knowledge base? What’s the input? What’s the output? How can the output be used?

We are looking for a computer science or engineering PhD/MSc student

**Required Skills:** Background in machine learning, NLP and deep learning; Good programming skills (Matlab / Python/ Java); Good research and self-learning skills

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

**Contact Details:** Michalsh@il.ibm.com
IBM:

**Failure Analytics for Highly Available Cloud Services**

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.

**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:** Summer internship.

**Contact Details:** Michalsh@il.ibm.com
IBM:

**Researcher in the Video and GIS Analytics group**

The Video and GIS Analytics group – part of the Multimedia Analytics department at IBM Research – specializes in advanced video technologies. This unique group focuses on novel approaches for information overload and technologies in the areas of video analytics and computer vision, 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:

- Scene text detection and recognition in natural videos and images
- Video scene detection
- Visual recognition, Anomaly detection 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:** MSC/PHD students with good research and self-learning skills, as well as with background in image and video processing, and preferably also in computer vision and machine learning. Good programming skills in MATLAB and C++ are required (prior acquaintance with OpenCV is a plus).

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

**Contact Details:** Michalsh@il.ibm.com

IBM:

**Machine Learning Research**

In our team we develop state-of-the-art technology for chatbots and chatbot construction. When constructing a chatbot, some preliminary data collection is usually required. Once
Experience with real users is gained, a new source of information emerges – existing conversations.

**Project Description:**

We offer two research projects in machine learning (including deep learning) and text analytics. In this project we would like to develop a systematic method and algorithms for collecting new user utterances from existing conversations. More specifically, from those situations in a conversation where the user is misunderstood and has to rephrase her words. In such cases, new utterances can be identified and added to the system so as to improve its understanding. The main challenge, however, is ensuring that we do not pollute the system with inaccurate and erroneous utterances, which may quickly deteriorate the chatbot’s accuracy.

As part of the project, the intern is expected to conduct a literature survey, devise a comprehensive solution for the task at hand, develop and implement the relevant algorithms (text analytics, machine learning), implement a testing framework, and conduct experiments.

**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
- MSC/PHD students
- Independent, self-learner
- Background in computer science / related disciplines
- Proficiency and hands-on experience in machine learning or text analytics
- Knowledge in deep learning and experience in TensorFlow is an advantage

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

**Contact Details:** Michalsh@il.ibm.com

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**IBM:**

**Deep Learning NL-LSTM – Next Generation RNN for Semantic NLP tasks**

LSTMs became the state-of-the-art deep-learning machinery for processing variable-length sequence data in various machine learning tasks. Dozens of architectures utilizing LSTM were used for different NLP tasks with moderate to good success rates. Two prominent examples are Neural Machine Translation [1], which showed improvement over all previous methods that included language knowledge, and
natural language generation in image captioning [2,3] and dialogs [4] that produced the highest quality of generated text available.

The core LSTM cell was introduced on 1997 for general sequence processing and variants of LSTM such as GRU were introduced later on. However, these variants still address general sequences ignoring the special nature of natural language sequences, with the exception of [5] we are aware of.

In a recent collaboration of members from our group, BIU and MIT [6] we showed that indeed LSTM representation shows a good sequence modeling ability, but at the same time it hardly captures the language related aspects of the sequence. The aim of this internship is to develop and test a new variant for LSTM for NL processing and generation that is considering the special nature of natural language sequences.

A large ecosystem of algorithms was built around LSTMs, including memory networks, attention mechanisms, stacking and more. With the right design, all these algorithms will be applicable to the new NL-LSTM we will build.

Job description:

During the internship, you will participate in design and lead the development of the NL-LSTM using the best deep learning platforms available with our team of deep learning experts. You will test the new variant on various NLP tasks and datasets, including proprietary datasets IBM possesses for advanced semantic NLP tasks. You will utilize IBM Research cluster of hundreds of GPUs available for our use to train and test new models. We plan for a highly influencing paper based on this work, submitted around 6 months following the internship period to one of the top machine learning or NLP conferences.

Required skills:

- MSc or PhD student in Computer Sciences/Engineering
- Proven work in the field of deep learning, advantage for natural language related work
- Superb programming skills, with experience in TensorFlow, TORCH, and/or Theano, with advantage to TensorFlow
- Self-discipline and the ability to work independently

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

**Contact Details:** Michalsh@il.ibm.com

**References**


**IBM:**

**Audiovisual Biometric Authentication**

We would like to explore innovative approaches to improve the robustness and accuracy of our speaker and face recognition biometric engines and detection of spoofing attacks (user
We propose to explore synchronous analysis of voice and the video (audiovisual) live input in order to improve accuracy, robustness and liveness detection.

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.

**Required skills:**

- PhD candidate from EE or CS
- Knowledge and Research Experience in machine learning and either computer vision, speech/signal processing
- Background in deep learning is an advantage
- Background in biometric identification or authentication is an advantage

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

**Contact Details:** Michalsh@il.ibm.com

**IBM:**

**Advanced topic modelling of chat**

Information overload is ‘Cognitive Diabetes’, says Slack's CEO. Indeed, recent years have witnessed the unprecedented growth of social group chat usage characterized by an 'always on' nature, making it hard for users to catch-up; especially after logging off for a certain amount of time. Therefore, there is an urgent need to understand team conversations. This includes handling discussion thread disentanglement, and methods to explore conversation threads.

This research project is aimed at:

1) Research and create a unified model for topical segmentation of group-chat feed accounting for chat characteristics as text sparsity & social collaboration patterns.

2) Apply model as a chat-bot / service in IBM Watson Workspace group-chat.

**Required skills:**
• Independent, self-learner
• MSC/PHD Students
• Good programming skills (preferably in Python / Scala)
• Proficiency and hands-on experience in machine learning
• Background in NLP and specifically graphical topic modelling is an advantage

Full/part time position: Summer internship.

Contact Details: Michalsh@il.ibm.com

IBM:

**Information Retrieval group- Dialog-driven Aggregated Search**

Job description: Aggregated search is a distributed Information Retrieval setting where a user query may be served by several sources (verticals); Answers retrieved from various sources, should be further aggregated and displayed to the user in an optimal way so as to maximize user’s utility. In this research, we shall study aggregated search within a dialog (conversational) setting. A dialog paradigm sets new challenges for an aggregated search system, where various dialog-based constraints such as the context and dialog limited UI display should be taken into consideration.

The outcome of this research can be two-fold. We may publish a paper in a top-tier IR/AI conference (e.g., SIGIR, CIKM, WWW, AAAI, IJCAI) focusing on the retrieval aspects of aggregated search in a dialog. Whereas, we may also publish a paper in an top-tier HCI conference (e.g., SIGCHI, IUI, RecSys, etc) focusing on the HCI aspects of such new search setting.

Required skills:
• PhD or Master level student in CS, EE or IS.
• Good programming skills (Java + JavaScript preferred).
• Basic knowledge in Information Retrieval (with preference to prior knowledge in advanced retrieval models or recommender systems).
• Prior knowledge with HCI techniques and UI development tools is a plus.

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

Full/part time position: Summer internship.

Contact Details: Michalsh@il.ibm.com

IBM:

Information Retrieval group- Personalized-Natural Language Generation (P-NLG)

NLG is the natural language processing task of generating natural language from a machine representation system such as a knowledge base or a logical form. In an IR (search) setting, NLG produce a summary of the search results that were retrieved for a given user’s information need (query). In this research, we shall study how NLG can be further personalized based on specific user tastes, knowledge, personality or context. To this end, we shall explore both extractive and abstractive NLG techniques and shall develop novel personalization extensions to allow better generation for a given user. The result of this research shall be published in a top-tier IR/NLP/HCI conference (e.g., SIGIR, ACL, Recsys).

Required skills:
• Phd or Master level student in CS, EE or IS.
• Good programming skills (Java preferred).
• Basic knowledge in Information Retrieval (with preference to prior knowledge in advanced retrieval models, recommender systems or NLP).
• Prior knowledge with state-of-the-art IR, ML or NLP tools is a plus.

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

Full/part time position: Summer internship.
IBM: IBM Cybersecurity Center of Excellence in Ben-Gurion University

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:
BSC/MSC/PHD students
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.

Contact Details: Michalsh@il.ibm.com

IBM: Advanced human-centric insight elicitation from wearable indicators

For graduate students / undergraduate students: Graduate students.

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, utilization 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., 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:** Summer internship.

**Contact Details:** Michalsh@il.ibm.com

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**IBM:**

*Intern for the Machine Learning for Healthcare research team*

Are you passionate about improving health? Are you passionate about the trending methods of machine learning and causal inference, deep learning, temporal modeling, reinforcement learning and transfer learning? If so, IBM machine learning research team provide such opportunities for you!

The Machine Learning for healthcare team in IBM Research is focused on developing novel machine learning methods to analyze a wide variety of real data in the healthcare and life sciences domains.

As a growing research team, our mission is to create world class machine learning
solutions for our clients.

we look for interns with background and research experience in machine learning, who are passionate to conduct cutting-edge research on challenging and trending open questions in the

Requirements:

interns with background and research experience in machine learning

MSC/PHD Students

Full/part time position: Summer internship.

Contact Details: Michalsh@il.ibm.com
IBM:

Security and Privacy in the Cloud

At IBM Research, we are working on providing security and privacy in the cloud by exploiting hardware based secure execution environments such as Intel's Software Guard Extensions (SGX). Intel SGX is a set of hardware/software extensions to the Intel architecture that aims to provide integrity and confidentiality guarantees to security/privacy of sensitive computations performed on a computer where the privileged software (e.g. host operating system of the cloud provider) is untrusted.

We aim to create solutions that would enhance the trust of people and organizations in using the Cloud, allowing them to place sensitive information in the Cloud. Our goal is to provide guarantees for security and privacy of the data and thus enable more applications and organizations in the area of health-care and finance to handle sensitive data in the Cloud.

We are applying this technology in several areas: how to run analytics (e.g., Apache Spark) in the cloud on sensitive data by exploiting Intel SGX; an architecture and tools for running multi-tier applications (like Internet of Things apps) that handle sensitive data leveraging encryption.

This project requires programming experience in languages like C/C++, Python and similar, and good technical and operating systems skills.

Participants will gain experience with leading edge technologies including Intel SGX, Apache Spark, blockchain, Cloud development, and more.

Position location: Tel-Aviv

Msc/Phd students with systems/hands-on skills (hacker type is one example) or background in security to cryptography - good hands on skills are required.

Full/part time position: Summer internship.

Contact Details: Michalsh@il.ibm.com

IBM:

Summer internship at IBM-Research in Medical Imaging

Position: Computer Vision/Machine Learning internship at the Medical Imaging Analytics Group
**Project Description:**

The Medical Imaging Analytics Group at IBM Research Haifa/Tel-Aviv is working to change the way radiologists work. We are looking for researchers in the field of computer vision and machine learning to join our team, developing state of the art algorithms for detection and classification of medical findings. Become familiar and gain experience in the clinical world of radiological imagery, explore the future and help improving patient treatment all over the world.

**We offer:**

An opportunity to work and publish with top researchers at IBM Research in the area of medical imaging, 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 Science/Electrical Engineering/Physics/Mathematics with focus on computer vision, machine 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.

Knowledge in Deep Learning is an advantage.

Knowledge in MATALB/Python and industry experience is an advantage.

**Contact Details:** Michalsh@il.ibm.com

**Check Point:**

**Summer Internships – CS, Technion 2016:**

Check Point is a pioneer in the IT security industry. Since 1993, it has been the industry leader in network security technology, with the release of FireWall-1 and with its patented Stateful Inspection Technology. Check Point’s success is based on constant technological innovation and a customer-driven philosophy, as well as a relentless focus on providing comprehensive, innovative security.

When you join Check Point, you become part of a driven and creative team dedicated to delivering innovative technologies and industry-best protection in this ever-changing threat landscape.

At Check Point, we secure the future. Join us and secure your future with us!

**Nation Wide Protection (large scale cyber security system)**

**Position (title of the project):** Nation Wide Protection (large scale cyber security system)

**For graduate students / undergraduate students:** Both

**Requirements:**
- Java programmer, experience with webservers and database, hands on capabilities
- Advantages: programming in Linux and Windows, ability to dive into existing code, scripting, C

Full/part time position: Both

HR contact: Nirit Shechter nirits@checkpoint.com

Check Point:

HOP

Position (title of the project): HOP

For graduate students / undergraduate students: Preferably graduate

Job description: Scalable platform scripting and commands line tools unification.

Requirements: Linux, TCL/BASH, C, Basic networking

Full/part time position: Preferably full time

HR contact: Nirit Shechter nirits@checkpoint.com

Check Point:

vSEC Centralized Log Monitor

Position (title of the project): vSEC Centralized Log Monitor

For graduate students / undergraduate students: Both

Job description: Design and develop a solution for centralized Log Monitor. Integrate to various ecosystem (private and public clouds) and collect all the audit/connection logs into one place and produce a clear view of what happening anyplace anytime. Learn methodologies and concepts of different systems and companies (AWS, Microsoft Azure, VMWare and more) to have the ability to get all the information. Eventually join all pieces in one location on the Check Point Security Management Server.

Requirements:
- SW development experience in Java, Python or other scripting languages
- Advantage to candidates with knowledge in private/public cloud environments (AWS, Microsoft Azure, VMWare)
- Networking background
• Basic experience with Linux OS

**Full/part time position:** Full

**HR contact:** Nirit Shechter nirits@checkpoint.com

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**Check Point:**

**Early Initialization of products in Cloud Environments**

**Position (title of the project):** Early Initialization of products in Cloud Environments

**For graduate students / undergraduate students:** Graduate

**Job description:** Research bootstrapping processes in all supported cloud technologies.

Design and implement a module that identifies the cloud technology at the time of installation and fully automates Check Point security deployment.

**Requirements:**

- High level of understanding in Linux OS. Linux programming experience being a strong advantage.
- C programming language

**Full/part time position:** Full

**HR contact:** Nirit Shechter nirits@checkpoint.com

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**Check Point:**

**vSEC Deployment Utility**

**Position (title of the project):** vSEC Deployment Utility

**For graduate students / undergraduate students:** Graduate

**Job description:** Looking for candidate who would like to experience public and private cloud technology and help develop tool which will be used to orchestrate checkpoint’s components in such environments.

In this role you will work with multiple cloud vendors and use many different APIs in order to interact with them.
Requirements:
- Experience with virtual platforms and knowledge in virtualization technologies (VMware/KVM/Hyper-V/Openstack)
- SW development experience in Java, Python and Power Shell.
- Advantage to candidates with knowledge web services.

Full/part time position: Full

HR contact: Nirit Shechter nirits@checkpoint.com

Check Point:

Enforce virtual machines activation and connection in a virtual fabric

Position (title of the project): Enforce virtual machines activation and connection in a virtual fabric

For graduate students / undergraduate students: Graduate

Job description:
- Research integration of Check Point Security Management Server with VMware vCenter.
- Design and develop a security solution for enforcing virtual machines activation and connection according to a security compliance policy.
- Develop the solution infrastructure and define the user experience for configuring the security compliance policy.

Requirements:
- Candidates should be experienced with Java and web application programming
- Advantage to candidates with knowledge in VMware virtualization technologies and VMware vCenter.
- Advantage to candidates with deep knowledge in Network Security.

Full/part time position: Full

HR contact: Nirit Shechter nirits@checkpoint.com

Check Point:

vSEC Orchestration plugins

Position (title of the project): vSEC Orchestration plugins

For graduate students / undergraduate students: Both

Job description: Looking for candidate who would like to experience public and private cloud technology and help develop plugins which will be used to orchestrate checkpoint’s solution.
Orchestration work is key feature to Data Center solution and covers many configurations and deployment types. Candidate should be able to document and transition the work done to other team members.

**Requirements:**
- Experience with virtual platforms (vmware/KVM/hyper-v)
- Basic experience with Linux OS
- SW development experience in Javascript, Python and other scripting languages

**Full/part time position:** Full

**HR contact:** Nirit Shechter nirits@checkpoint.com

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**Check Point:**

**vSEC traffic clarity**

**Position (title of the project):** vSEC traffic clarity

**For graduate students / undergraduate students:** Both

**Job description:** A powerful visualization tool that constructs a real-time topology of cloud assets, including security groups, instances and more. vSEC traffic clarity gathers the required information and automatically categorizes cloud entities based on their exposure to the public, allowing admins to find misconfigurations and security threats and remediate them.

In this role you will develop a tool that will analyze big data information received from the cloud and create visibility information on the customer cloud network.

**Requirements:**
- Networking background
- SW development experience in CPP, Java, Python

**Full/part time position:** Full

**HR contact:** Nirit Shechter nirits@checkpoint.com

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**Check Point:**

**Threat intelligence feeder (aka Soctopus)**

9. **Position (title of the project):** Threat intelligence feeder (aka Soctopus)

**For graduate students / undergraduate students:** Both
**Job description:** Design and implement Web scraper, scraping, tagging and alerting on content from security/technological blogs alerting on new malwares and security vulnerabilities/exploits detected.

**Requirements:**
- Basic python/node.js or other scripting language.
- Basic knowledge in web development.

**Full/part time position:** Both

**HR contact:** Nirit Shechter nirits@checkpoint.com

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**Check Point:**

**GooglePlay anomaly detection based on users comments**

**Position (title of the project):** GooglePlay anomaly detection based on users comments

**For graduate students / undergraduate students:** Both

**Job description:** Applying Machine learning alg. on negative comments in google play for detecting malicious applications

**Requirements:**
- Basic python
- Basic knowledge in web development
- ML courses or experience

**Full/part time position:** Full

**HR contact:** Nirit Shechter nirits@checkpoint.com

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**Check Point:**

**Smart Web scraper for mobile apps**

**Position (title of the project):** Smart Web scraper for mobile apps

**For graduate students / undergraduate students:** Both

**Job description:** Web scraper of hype mobile applications relating to current events (big sports event, politics etc.)

**Requirements:**
- Basic python/node.js or other scripting language
Basic knowledge in web development.

Full/part time position: Both

HR contact: Nirit Shechter nirits@checkpoint.com

Check Point:

Code flow analysis for mobile native code

Position (title of the project): Code flow analysis for mobile native code

For graduate students / undergraduate students: Both

Job description: research the implementation of static code flow analysis for android native code.

Requirements: graduate student who has experience in the field of static code analysis.

Full/part time position: Both

HR contact: Nirit Shechter nirits@checkpoint.com

Check Point:

Dynamic Malware analysis platform

Position (title of the project): Dynamic Malware analysis platform

For graduate students / undergraduate students: Graduated

Job description: Join us on an exciting project to develop and enrich an automated analysis platform.

In this project you will investigate and analyze different malware families and behaviors, and add detections to our dynamic analysis tools.

Requirements: Bsc in CS or similar

Full/part time position: Full time position, at least 5 months

HR contact: Nirit Shechter nirits@checkpoint.com

Check Point:

IoT development
Position (title of the project): IoT development

For graduate students / undergraduate students: both

Job description: Develop products for IoT security and Research topics in IoT. build scenarios from real life involving IoT devices, look for attacks that can be demonstrated on this scenarios, look for ways to protect against those attacks. Develop products that can help protect IoT.

Requirements:

- Team player, fast learner, ability to work in a multi-tasked and dynamic environment.
- Hands on experience in one of the following programing languages: Java/Python – must
- Knowledge in: Linux / shell scripting/ java script/ Html – must
- Experience working with Wireshark – an advantage.
- Experience in IoT – an advantage
- Experience in reverse engineering of firmware, cross compilation and building a toolChain using buildRoot – a significant advantage
- Knowledge in cyber security and exploitation techniques – an advantage.
- Knowledge in ZigBee, Zwave, Thread, BLE - a significant advantage

Full/part time position: both

HR contact: Nirit Shechter nirits@checkpoint.com

Check Point:

Critical Infrastructure Security developer

Position (title of the project): Critical Infrastructure Security developer

For graduate students / undergraduate students: Graduate

Job description: Develop security products for critical infrastructure and SCADA environments. Dive into SCADA protocols and develop deep protocol inspection. Research how PLCs communicate and discover vulnerabilities and new attack vectors.

Requirements:

- Autonomous and fast learner.
- Development experience in C/C++ and Python.
- Knowledge in Linux systems
- Experience in networking and protocols - advantage
- Experience with SCADA environments – advantage
- Reverse engineering capabilities – advantage

Full/part time position: Full
Check Point:

Cyber Data Mining

Position (title of the project): Cyber Data Mining

For graduate students / undergraduate students: Both

Job description: “Reports that say that something hasn’t happened are always interesting to me, because as we know, there are known knowns; there are things we know we know. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns – the ones we don’t know we don’t know. And if one looks throughout the history of our country and other free countries, it is the latter category that tends to be the difficult ones.” (Donald Rumsfeld)

This internship position would involve both research and development in order to uncover the known unknowns and the unknown unknowns of the cyber-attacks in the wild.

Requirements:
- Python (pandas & scikit-learn experience is a great plus)
- Academic background in machine learning/data mining
- SQL knowledge
- Data lover – a must

Full/part time position: Both

Check Point:

QA (Apollo 2017)

Position (title of the project): QA (Apollo 2017)

For graduate students / undergraduate students: both

Job description:
- Troubleshoot problems with RnD effectively until result is achieved
• Report and monitor the given tasks/releases on a daily/weekly basis
• Create relevant documentation and correct obsolete documentation
• Meet Releases deadlines

Requirements:
• Basic networking knowledge
• Basic code and scripting knowledge – big advantage
• Responsible individual
• Working in team environment
• Meeting given deadlines
• Organizing and documentation skills

Full/part time position: Full time, available for at least 4 months of work.

HR contact: Nirit Shechter nirits@checkpoint.com

Check Point:

Senior R&D/Data scientist

Position (title of the project): Senior R&D/Data scientist

For graduate students / undergraduate students: graduate students

Job description: Design and develop novel data driven solutions that have the potential to deliver game changing results.

Lead the research and development of a new innovative product for cyber security, involving correlation algorithms, machine learning, and performance and scalability optimizations.

Quickly iterate on design approaches and POCs based on data and user feedback.

Push the solutions all the way to delivery on large scale production systems. Understand the architectural constraints, integration and operational needs of such systems and work with a cross-organizational engineering and product team to quickly transition from prototype to a scalable robust implementation.

Requirements:
• Bright, out of the box thinker, motivated, quick learner, goal driven, focused.
• Proven ability to build and deliver solutions in a short time frame.
• Team player, strong communication skills, good English.
• Good knowledge of at least one scripting language, preferably Python.
• Research background, algorithms, statistics, machine learning, large data set analysis – an advantage.
• Background in networking – an advantage. Cyber security background – a big advantage.
• SQL, Java, JDBC, ORM/Hibernate, Spring, Maven – an advantage.
• Big Data (Hadoop, NoSQL, Solr, Spark, Elastic Search) – an advantage.
- Familiarly with Linux, Java open source frameworks and tools – an advantage.

**Full/part time position:** Full

**HR contact:** Nirit Shechter nirits@checkpoint.com
**Amdocs**

**Natural Language Processing researcher**

**Company:** Amdocs

Position for M.Sc., Ph.D. students or post-doc

**The role (title):** Natural Language Processing researcher

**General background:** Amdocs is a leading company in delivering software for telecommunication providers around the globe. Amdocs Intelligent Operations division is a telecom industry leader of managed services solutions. You are invited to take part in a new growing research team focusing on AI to improve operation services.

**Responsibilities:** Our objective is to analyze, classify and parse free-text IT tickets in order to trigger an automatic ticket resolution system.

**Amdocs will supply:**
- Extensive training set of tickets, including experts’ classification
- Professional dedicated consulting
- Laptop and analysis tools.

**Requirements:**
- An applied statistics and computer science background (M.Sc., Ph.D. students or post-doc), with preference to NLP experience
- Full/Part time position: Full time (80%-100%), until end of April.
- Remote work is possible: at least 2 days a week at Amdocs office in Raanana.

**Contact details:**
Gilli Shama, Chief Data Scientist, gillis@amdocs.com, 09-7786214, 052-6148768
Yaniv Avrashi, Data Scientist, yanivavr@amdocs.com, 09-7764491, 052-8936714