Ahmad Badary (AJ)

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Summary

Strong knowledge of Machine/Deep Learning, Statistical Learning Theory and Optimization. Expertise in applying the different algorithms to Natural Language Processing/Understanding problems, in particular, and to problems in Data-Science in general. Research experience in Deep Learning, Learning Theory, Quantum Computing, Particle Physics, and Information Theory (compression). Specific work on generative models, generative compression (image/text), Embeddings, medical NLP, natural language dialog systems and assistants, and Knowledge Graphs.

CORE COMPETENCIES

- Machine/Deep Learning
- Software Engineering
- Leadership & Managerial Experience
- NLP/NLU
- Theoretical/Applied Quantitative Skills
- Communication & Presentation Skills

Academics

UC BERKELEY (2014-2017)

- *Major(s)*: Computer Science, Applied Math, Physics*
- *Relevant Coursework:*
  - CS 231n – Convolutional Neural Networks for Visual Recognition [image classification, localization and detection.]
  - CS 224n – Natural Language Processing with Deep Learning [Sequence Modeling, Recurrent Nets, NLP] (Stanford)
  - CS 289 – Machine Learning [Regression, Decision Trees, Ensemble Learning, Neural Networks, SVM, Clustering]
  - EE 227 – Optimization Models [Convex / Conic Optimization, Duality, robustness, stochastic programming]
  - CS 270 – Combinatorial Algs [Multiplicative Weights, Gradient Descent, Streaming (SDP), Boosting, Hashing]

Work Experience

- **SUKI AI [05/2018 - 02/2019]**
  - **Title:** AI/ML Tech Researcher - NLP Focus
  - **Desc:** Worked on many NLP/NLU problems in the personal-assistant space. Designed+Built a complete Intent-Extraction system. Built a complete Medical-Model Ontology (unsupervised). Designed+Built a complete End-to-End "Online-Learning Model Management System".
- **Mobsquad Inc. [04/2019 - 05/2020]**
  - **Title:** Machine Learning Software Engineer
  - **Desc:** Consulted with multiple clients as an Applied Research Scientist on problems of Text Classification, Data Anonymization, Activity Segmentation, Summarization, Topic Modeling, Billing-Codes Assignment/Classification. Helped multiple AI departments on areas of core NLP and NLU problems.
- **Time by Ping [05/2020 - 05/2022]**
  - **Title:** Director, AI
  - **Desc:** Lead the AI team at Time By Ping, an Enterprise SW company utilizing AI in the Law space. Problems included capturing lawyers' work on various devices and classifying (assigning) it to the different clients and cases they were working on, as well as Grouping relevant "units" of work together. Anonymization of the data collected. Building a stable, resilient AI infrastructure and data pipeline. Adding natural language descriptions to the units of work using advanced NLP techniques. Finally, matching different units of work to their billable codes to speed up the billing process.

Qualifications and SKILLS

- **PROGRAMMING**
  - Python [Proficient] + (Flask - MongoDB - SQL)
  - GoLang [Proficient]
  - Java / C / C++ [Familiar]

- **Specialized Skill-Set**
  - Machine Learning / Deep Learning
  - AI / Autonomous systems
  - TensorFlow / Keras / PyTorch / JAX
  - Natural Language Processing
  - Analytic Algorithms [Page-Rank, Streaming, Sampling, Mult.weigh update, Boosting, randomized alg's]
  - Graph Theory / Spectral Graph Theory / Graph Clustering and Partitioning

Research and Projects

- **Computer Science and Tech**
  - Wind Turbines Optimization [Patent]
    A patent for a system based on LIDAR technology, that uses gradient optimization methods and machine learning to analyze the dynamics of the wind and optimize the rotational directions of mechanical wind turbines to optimize the global (overall) energy converted by a wind farm.
  - State of the Art: Generative Text Compression [Project + Paper (pending)] (UC Berkeley)
    Built sota text compression using intelligent, learned transformations of the input to reduce the overall entropy of the text.
  - State of the Art: Intent Extraction/Parsing System [Paper+Project] (Suki AI)
    Built sota system for extracting intent from natural text - part of an intelligent assistant agent. 99.7% Accuracy / 0.98 F1. 41% relative improvement over Google's DialogueFlow and 48% over Amazon's Intent Parser. System/Model was in place for 4+ years without any revisions.
  - State of the Art: Slot Extraction/Filling System [Paper+Project] (Suki AI)
    Built sota system for Slot Extraction and Filling from natural text - part of an intelligent assistant agent. 98.4% Accuracy / 0.97 F1. 40% relative improvement over Google's DialogueFlow and 46% over Amazon's Intent Parser. System/Model was in place for 4+ years without any revisions.
  - 4 provisional Patents on Voice-Based Assistant Technologies [Patents] (Suki AI)
    Multiple Patents created for Suki AI spanning various NLP/NLU technologies including Intent Parsing, Slot Filling, Text Embeddings (word/sentence/document-levels), as well as an ingenious method to improve on the theoretical limit of accuracy of the voice commands by amending the ASRs outputs provided by Google's Speech Recognition system to be more geared towards medical vocabulary.
  - SOTA Model for Dynamic Multiclass Classification of "Work Units" to intended Clients [Project] (TBP - Time By Ping AI)
    Built a model that can classify "chunks" of work performed by users (lawyers) captured on their devices (computers, phones, etc) into their respective clients for tracking work and billable hours. The users' clients were dynamically changing as old clients leave and new clients come onboard.
  - Brain-Controlled Vehicles [UC Berkeley]

    Signal processing. Working with EEG waves and analyzing how they are used to control and manipulate certain vehicles, i.e. quad-copters. Succeeded in refining a navigation system by using sota deep learning to model the EEG waves produced by the brain.
  - The VR-ry Night [Cal-Hacks]
    Link: https://devpost.com/software/stylistic-rendering-of-street-view-with-motion-control
    "Our project is a VR environment that uses deep learning techniques to transfer artistic style to any given panorama. We can then visualize the panorama with Oculus, and with Google street view we can do it for any real world place, making it feel like the person is walking around in a painted world."

- **Physics**
  - Assessing the Potential of the Casimir Effect. Looking into potential uses of the Casimir effect in, clean renewable energy based, jet propulsion systems.

- Methods for a Mathematical Formulation of Quantum Mechanics in 5-D [Cairo, Egypt]

  Developing mathematical tools, 5-d metric space and a working field, for a framework of modern physics working in four-dimensional Spacetime plus one spatial dimension in the hope of resolving the discrepancy of wave-particle duality.
- Ongoing Mathematical Study of the Geometry of Spacetime in General Relativity [independent]

  An attempt at a more rigorous formulation of the Geometry of Spacetime using Minkowski spaces and the Lorentz group. Ref: Group Theory and General Relativity | Carmeli / Comprehensive Differential Geometry | Spivak.

Writings and Publications

- **[Refer to Personal Website (above)]**

Teaching Experience

- **Computer Science 189 | Machine Learning [UC Berkeley]:** TA (Academic Staff)
- **Computer Science 61c | Computer Architecture [UC Berkeley]:** Lab TA (Course Staff)
- **CS 61a/61b/170/189/70 + Math 1a/1b/113/110/104/202a/b [UC Berkeley]:** Tutor