Constant Marks

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PROFESSIONAL SUMMARY

Constant Marks is a student at UNT and plans on wrapping up his computer science Ph.D. degree next Spring. His research focus is AI with an emphasis on fundamental research in continual learning. This way of learning, which resembles our evolved learning system, is likely a fundamental step to a more generalized form of intelligence. His multidisciplinary professional and academic career spans the fields of biology, environmental science, mechanical engineering, and computer science.

EDUCATION

University of North Texas | Denton, Texas   GPA: 3.9
Computer Science   Anticipated Graduation: May 2022

University of California | Berkeley, California   GPA (Technical/Overall): 3.4/3.1
Biochemistry   August 2000 - May 2004

EXPERIENCE

University of North Texas | Research Assistant   **2018 – Present**
Carried out research on multiple phases of projects funded by the Office of Naval research, with a focus on developing algorithms to protect against cyber threats in the expeditionary cyber environment.

KEY ACCOMPLISHMENTS
- Recruited to project from outside of department by demonstrated prowess for understanding and explaining fundamental concepts in machine learning
- Expanded project scope by writing and winning proposals for multiple rounds of funding
- Developed semi-supervised machine learning algorithms applied to streams of sensor data and network packet information
- Creating data processing and feature extraction pipelines to handle asynchronous data collection routines
- Built a software suite for creating and visualizing map layers from noisy and disparate data streams
- Currently developing continual-learning algorithms to detect novel security threats

University of North Texas | Teaching Assistant   **2018 – 2019**
- Taught the fundamentals of programming to young engineers

Geosyntec Consultants | Project Scientist   **2014 – 2017**
- Manipulated and interpreted large and complex data sets, including plant process, site excavation, CEM, and meteorology data
- Developed novel SO3 measurement and control strategies and laser based elemental analysis measurement techniques

E1E & Apogee Scientific | Senior Scientist   **2007 – 2014**
- Supported the design, construction, and operation of bench, pilot, and full-scale research projects
- Extensive instrumentation programming and control experience working with a variety of CEM and industrial processes

Proteomtech, Inc 1 Engineering | Scientific Associate   **2004 – 2006**
- Worked on recombinant protein production from bacterial growth to liquid chromatography purification
- Setup and maintained mammalian cell culture lines for functional assay analysis of purified proteins

SERVICE

Engaging the community in citizen science
- Leading and promoting citizen science workshops for children and adults to establish a network of low cost IoT air quality sensors

SELECT PROJECT ABSTRACTS

ShadeMyRun: Identifying tree coverage using satellite imagery

Runners, especially those in warmer climates, often run into the issue of overheating outdoors. This can lead to unwanted consequences such as dehydration, headaches, dizziness, and even fainting. The ShadeMyRun mobile app was developed to help runners identify routes with ample shade provided by tree cover. The project used LiDAR data to train a model to identify tree cover within more widely available satellite imagery data. With the simple entry of an origin and turn-around point, the user can identify shaded route options on low-volume roadways, and route details such as shade percentage, distance, and elevation.

Real-time tumor tracking with Kalman filter.

Tumor motion caused by breathing can impact dose delivery in patients with lung cancer, leading to poor disease management and damage to surrounding normal tissues. A major challenge in tumor tracking using fluoroscopic imaging is to track the tumor while it is occluded by the overlapping bones (ribs and spine). Tracking tumors occluded by obstructions was simplified to localization of a bouncing ball through video frames. Kalman filter was applied, and real-time localization estimates with uncertainty were displayed over each video frame over the image. The proof of concept was validated for eventual implementation in a tumor tracking system.

Identifying topic drift in reddit using LDA topic modeling

Threads of posts on a message board will often drift at some point from the original topic. Topic drift is frequently linked to incoherence and frustration in online communities using computer-mediated messaging systems. We built a topic modeling system that can determine when a thread begins to diverge from the original topic idea. The unsupervised clustering model, Latent Dirichlet Analysis (LDA), was used to build a topic model from reddit data. Topics were successfully identified, and scores attributed to each post. A front-end system to visualize topic cohesion and drift was developed as a web application.

NewW-B: News Web-Based Aggregator

As a practice in database tools a news article aggregator was created with a Django front-end and a NoSQL backend. The web application was developed with full functionality, allowing users to subscribe, comment, favorite and rank articles, and news sources. Customized lists of articles were created based on user preference and a recommendation algorithm. Full simple and advanced search functions were implemented as well as account security protocols and user data encryption methods.

PUBLICATIONSAND PRESENTATION

Northeim K, Marks C, Tiwari C. **Evaluating spatial patterns of seasonal ozone exposure and incidence of respiratory emergency room visits in Dallas-Fort Worth**. PeerJ. 2021 Apr 13;9:e11066. doi: 10.7717/peerj.11066. PMID: 33954029; PMCID: PMC8051349.