JT Turner Ph.D. (+34 Handicap Golfer)

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About Me

I am fulfilled by using machine learning and computer vision models to understand the underlying distributions of data for personal learning/curiosity, and improving product performance.

Relevant Experience

Knexus Research Corporation   *National Harbor, MD*
Senior Research Scientist (2023 - Present): Prototyped and experimented with SOTA vision and NLP convolutional neural networks and transformers to answer questions and form new ones for proposals and grants.
Research Scientist (2015 - 2018): Read and researched state of the art deep learning and image processing algorithms related to deep learning, developed and tested algorithms for region proposal and hypothesis revision at Knexus in experimental settings. Used results to create research papers to be presented at conferences, and consult with other research engineers on product development.

Deloitte   *McLean, VA*
Specialist Senior (2022 - 2023)
Serving as a cross industry SME in computer vision/artificial intelligence, I've helped clients better understand the data they have, and build strong predictive models in a scalable easy to use way using SOTA tools.

Accenture   *Arlington, VA*
Data Science Consultant (2019 - 2022)
As a data science consultant I have been used as a subject matter expert and machine learning programer both for internal firm projects, as well as for a variety of clients including advertising companies and utility companies to better understand the data they have, and build predictive modeling tools to increase profit.

Clarifai   *Tysons, VA*
(Acting) Research Manager (2019): Worked in conjunction with executive team, product management, and engineering teams in order to build out a complete research team, and carryover ideas into practice and product
Senior Research Scientist (Aug 2018 - 2019): Researched, implemented, and contributed to state of the art aerial detection for government projects. Used knowledge and prototype results to guide company decisions and projects moving forward.

Navy Center for Applied Research in Artificial Intelligence   *Washington, DC*
Student Research Contractor (2014): Developed and tested in house and open source packages for feature extraction in images and video by modifying network topologies, presented findings at weekly research meetings for the *Recursive Structure Learning* project.

UMBC Computer Science Department   *Baltimore, MD*
Graduate Research Assistant (2013-2014): Researched machine learning in the medical domain, wrote papers, advised and helped implement deep learning with other labs.

<u>Undergraduate Teaching Assistant (2012):</u> Served as a lab section TA for intro to computer science (for majors) taught in the python programming language.

<u>Selected Projects</u>

- <u>Healthcare Risk Adjustment (2022-2023)-</u> For this project I was given an enormous dataset (~30 TB) of tabular data related to medical diagnosis, encounters, and beneficiary demographic information with the goal of understanding and improving risk score calculations to be robust against medical diagnosis upcoding.
    - <u>Environment:</u> Amazon AWS
    - <u>Tools:</u> Sagemaker, Athena, Snowflake, S3
    - <u>Py libraries:</u> pytorch, sklearn, scipy, numpy, pandas
    - <u>Algorithms:</u> XGBoost, ElasticNet, Gradient Boosting Machines, Logistic Regression, MLP
- <u>College/University Curriculum Development (2022)-</u> For this project I was working with two universities to help their graduate students at developing a machine learning/computer vision curriculum hosted locally on a laptop to a GCP environment from scratch.
    - <u>Environment:</u> Google GCP
    - <u>Tools:</u> Vertex.AI, AutoML, Cloud Storage
    - <u>Py libraries:</u> pytorch, tensorflow, sklearn, scipy, numpy, pandas, cv2
    - <u>Algorithms:</u> Vision Transformer, ResNet, VGG, Logistic Regression, XGBoost, Random Forest
- <u>MRI/CT Anomaly Detection with Transformers (2022)-</u> For this project I was working to apply swin transformers to 3D/4D radiographic images taken from the medical segmentation decathlon challenge for segmenting cancerous cells/organs. A visualizer of the high dimensional output had to be created as well.
    - <u>Environment:</u> GPU Server (Unixbox)
    - <u>Py libraries:</u> Pytorch, monai, dipy, sklearn, numpy, cv2, matplotlib
    - <u>Algorithms:</u> Swin n-Dimensional Vision Transformers
- <u>Medical mailroom document sorting/parsing (2021)-</u> For this project I was asked to design and implement a system that would take in medical documents, sort them at three different levels of granularity, and given the classifications extract fields/values from the document according to a business ruleset.
    - <u>Environment</u>: Amazon AWS
    - <u>Py libraries:</u> cv2, google-vision, pytorch, sklearn, numpy
    - <u>Algorithms:</u> CNN classification, k-means clustering, support vector machines, XGBoost
- <u>Medical Document Parsing (2020)-</u> For this project, I was asked to do research and development on a small group of computer vision tasks to be used in an upcoming project. These were (1) develop a method to differentiate machine writing from handwriting, (2) develop a free (no api call) method for determining a documents orientation and correcting, and (3) test the efficacy of tesseractOCR on a labeled corpus of interest. (1) worked and was patented, (2) made its way into production code, (3) tesseractOCR was insufficient.
    - <u>Environment:</u> Amazon AWS
    - <u>Tools:</u> Sagemaker, Athena, tesseractOCR
    - <u>Py libraries:</u> cv2, sklearn, google-vision, numpy
    - <u>Algorithms</u>: Contour Detection

Education
University of Maryland Baltimore County
Baltimore, MD

Computer Science PhD, GPA: 3.47	Graduated May 2019
Computer Science M.S., Thesis track, GPA: 3.47	Graduated Dec 2014
Computer Science B.S., Math minor, GPA: 3.41	Graduated May 2013

Skills
Languages: Highly experienced in Python2/3. Experienced in Common Lisp, Java, Bash, C.
Environments: GCP, AWS, baremetal
Libraries: pytorch, numpy, caffe, tensorflow, opencv, scipy, monai
Deep Learning Algorithms: Tabular Regression/Classification (Logistic Regression.
Multilayer Perceptron). Image Classification (ViT Vision Transformer),
Detection/Segmentation (Unet, Yolo, ViT Transformer), Time Series (LSTM, ViT
Transformer). Lightly experienced in personal projects with diffusion models and LLMs/

Patents
(2020) US1 1495039B2 Processing Digitized Handwriting- Using techniques of background
subtraction, morphological opening/closing, contour detection, and hu moment shape
analysis, the software system is able to return whether or not a word is machine
written or handwritten along with the probability of classification.

Selected Publications
(2019) NOD-CC: A Hybrid CBR-CNN Architecture for Novel Object Discovery (ICCBR 2019
oral presentation, 1st author): Expanding upon the 2018 ICCBR publication, designing a
hybrid architecture for detection that allows for higher accuracy inferring new
objects while still maintaining the flexibility of a CBR system.
(2018) Novel Object Discovery using Case-Base Reasoning and Convolutional Neural
Networks (ICCBR 2018, 1st author): Using the output vectors of a residually trained
convolutional neural network, create a case base to determine which unlabeled objects
should be considered as the same "imaginary classes".
(2014) Deep belief networks used on high resolution EEG data for seizure detection
(AAAI Workshop 2nd author): Given high resolution multichannel EEG data, variants of
DBN network topologies were used on preprocessed features to detect seizures.
(2014) Comparing Raw Data and Feature Extraction for Seizure Detection with DL Methods
(FLAIRS-27 Conference 1st author, 2014): Rigorous comparison of hand crafted features
fed to DBNs against raw data given to deep autoencoders to detect seizures.
Other Publications
(2019) "VISUAL COMPUTATIONAL CONTEXT: USING COMPOSITIONS AND NON TARGET PIXELS FOR
NOVEL CLASS DISCOVERY (PhD Dissertation)", *accepted at final defense.*
(2017) Using DL to Automate Feature Modeling in Learning by Observation (AAAI Workshop
2nd author)
(2017) Using Deep Learning to Automate Feature Modeling in Learning by Observation
(FLAIRS-30 Conference 2nd author)
(2016) SPARCNN: SPAtially Related Convolutional Neural Networks (IEEE Workshop 1st
author)
(2016) Keypoint Density-based Region Proposal (IEEE Workshop 1st author)
(2015) Convolutional Architecture Exploration for Action Recognition and Image
Analysis (NCARAI Tech Note, 1st author)
(2014) "TIME SERIES ANALYSIS USING DEEP FEED FORWARD NEURAL NETWORKS" *Accepted at
final defense.*

Interests: Baseball, Fishing, Home repair/maintenance, Formula 1 racing, Writing, Golf
Opinions: The designated hitter should not exist.