Saeb Ragani

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Linkedin Github Portfolio

Objective

Seeking full time position in Data Science, Machine Learning with special focus in wearables' signals/ time series analysis

Skills

RESEARCH
Machine Learning, Deep Learning, Data Mining, Statistical Analysis, Statistical Process Control, Signal Processing, Time Series Analysis, Sensor Fusion, Bio-Mechanics, Image Processing, Kalman Filter

CODING SKILLS
Python:
Pandas, Scipy, Scikit-learn,PyWavelets
Tensorflow, Keras, Open-CV, sktime
R:
dplyr, tidyverse, ggplot2, Caret, H2O
Matlab, Fortran, SQL

OS
Linux, Windows

FAMILIAR WITH
HTML/CSS, JavaScript

Education

2016 - PRESENT
PHD, MECHANICAL ENG.
SUNY at Buffalo
Buffalo, NY

2012 - 2014
MSC, MECHANICAL ENG.
Eastern Mediterranean University
Magusa, Turkey

2005 - 2010
BSC, MECHANICAL ENG.
K.N. Toosi University of Tech.
Tehran, Iran

Teaching Experience

DYNAMICS SYSTEMS LAB
2 Semesters at UB ***Buffalo, NY***

THERMODYNAMICS
4 Semesters at UB ***Buffalo, NY***

Experience

2018-NOW **University at Buffalo** **Research Assistant at Bio-Mechanics Lab**

Gait Analysis in Material Handling Workers:

In this project I analyzed the biomechanical signals collected from human subjects who performed long duration of material handling in order to investigate the changes in their gait cycles as potential indicators of fatigue. I used Inertial Measurement Unit (IMU) signals and by application of Kalman Filtering in Matlab, removed the gravity component from the acceleration signal in global frame. We developed 2 Statistical Process Control (SPC) frameworks to monitor the changes in the gait cycles in a near real-time fashion from the ankle IMU signals.

Matlab, R, R-Markdown

Remote Monitoring of Electric Line Workers:

I used the signals from single wrist-worn accelerometer collected from 40 subjects who performed the activities of electric line workers. The project goals included 1) activity change point detection 2) activity recognition, and 3) counting the number of repetitions. I investigated the signals in the time domain for change point detection, time, frequency (FFT), and time-frequency (discrete wavelet) domains for activity recognition, and time-frequency (continuous wavelet) domain for repetition count. I performed the analysis in python where I extensively utilized the following packages: Pandas, Scipy, Scikit-learn, Tensorflow, Keras, Open-CV, and sktime.

Python, Jupyter Lab

Kinematic Analysis of Back And Shoulder in Material Handling Workers:

We recruited participants to perform palletizing/depalletizing task for 3 sessions. Using Vicon motion capture system and Nexus software we collected the coordinates of reflective markers attached to the upper body and calculated the shoulder and back kinematics. We investigated the effect of repetition on the worker's shoulder and back kinematic characteristics.

Vicon Nexus, Matlab, Python, Jupyter Lab

2016-2018 **UB Neurosurgery** **Research Assistant**

Simulation of Intracranial aneurysm Treatment:

I conducted in-vitro validation of simulations of endovascular treatments in cerebral aneurysms. We constructed in-vitro silicon duplicates of patient-specific aneurysms and had them treated by neurosurgeons using coils/stents. The phantoms were connected to a flow loop that mimiced the physiological cerebral circulation and the post-treatment flow regime was captured using particle image velocimetry (PIV) as the gold standard for validation of CFD flow field.

Matlab, StarCCM, Fluent, Tecplot, LabView

2014-2016 **Med-X Research Institute, Shanghai** **CFD Engineer**

Effect of Different Imaging Modalities on CFD Simulations:

I worked with a team to investigate the effect of different imaging modalities on calculation of Fractional flow Reserve (FFR), used for coronary diseases treatment strategy planning. We used two coronary imaging methods i.e. Coronary Computed Tomography Angiography (CCTA) and Invasive Coronary Angiography (ICA) to reconstruct the vascular lumen. Using Computational Fluid Dynamics (CFD), we calculated the blood flow and FFR in the reconstructed lumen to investigate the effect of image resolution.

Fortran, ANSYS Fluent, Tecplot

Selected Publications (Google Scholar)

A PERSONALIZED AND NON-PARAMETRIC FRAMEWORK FOR DETECTING CHANGES IN GAIT CYCLES
IEEE Sensors (Accepted)

ACTIVITY RECOGNITION IN ELECTRIC LINE WORKERS FROM SINGLE WRIST-WORN ACCELEROMETER
PLOS One (Submitted)

ALTERATIONS IN SHOULDER AND BACK KINEMATICS IN PALLETIZING TASK
Sensors (Submitted)

A DATA ANALYTIC FRAMEWORK FOR THE AUTOMATED QUANTIFICATION O FERGONOMIC RISK FACTORS ACROSS MULTIPLE TASKS USING A SINGLE WEARABLE SENSOR
Applied Ergonomics (Under Preparation)

CHALLENGES AND OPPORTUNITIES FOR STATISTICAL MONITORING OF GAIT CYCLE ACCELERATION OBSERVED FROM IMU DATA FOR FATIGUE DETECTION
IEEE BioRob (2020)

IMPROVING ACCURACY FOR FINITE ELEMENT MODELING OF ENDOVASCULAR COILING OF INTRACRANIAL ANEURYSM
PLOS One (2019)

THE IMPACT OF IMAGE RESOLUTION ON COMPUTATION OF FRACTIONAL FLOW RESERVE: CORONARY COMPUTED TOMOGRAPHY ANGIOGRAPHY VERSUS 3-DIMENSIONAL QUANTITATIVE CORONARY ANGIOGRAPHY
International Journal of Cardiovascular Imaging (2016)

IN VIVO CALCULATION OF ENDOTHELIAL SHEAR STRESS USING CORONARY COMPUTED TOMOGRAPHY ANGIOGRAPHY: COMPARISON WITH INVASIVE CORONARY ANGIOGRAPHY
JACC (2015)

Other Projects

FALL 2019 **CSE 601**

Clustering & Classification:

I implemented 5 clustering and 4 classification algorithms in Python without the use of existing libraries. The 5 clustering algorithms included K-means, Hierarchical Agglomerative, Density-based, Mixture Model, and Spectral Clustering. Also, the 4 classification algorithms included k-Nearest Neighbor (k-NN), Decision Tree, Random Forest, and Naive Bayes

Python

SPRING 2020 **CSE 574**

Fairness in Machine Learning:

Machine learning algorithms can be biased based on the training data provided to them. I investigated 5 potential post-processing methods to enforce constraints in attempts to reflect different measures of fairness. I tried to optimize the post-processing evaluation methods to improve the fairness in 3 ML models including Linear Support Vector Regressor, Feed-forward Neural Network, and Naive Bayes Classifier. The evaluation methods included maximum profit/maximum accuracy, single threshold, predictive parity, demographic parity, and equal opportunity. Using each of these approaches the accuracy and other performance metrics were compromised in order to achieve higher fairness based on different fairness metrics.

Python