LUIS RIERA

DATA SCIENTIST

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Skills

COMPUTER VISION

OpenCV
Human Pose Estimation
Image Processing
Object Detection

DEEP LEARNING

Neural Networks (CNN, RNN, LSTM, Autoencoders)
TensorFlow - Keras

MACHINE LEARNING

KNN
K-means Clustering
Linear Regression
Logistic Regression
Random Forests
Gradient Boosting
SVM
Time Series

PROGRAMMING/SOFTWARE

Python (Numpy, Pandas, Sci-kit Learn, SciPy)
Docker
C#
MATLAB
Unity3D
Blender
PySpark
git

DATA VISUALIZATION

matplotlib
seaborn
qt5

DATABASE MANAGEMENT

MongoDB
Postgres-SQL

CLOUD COMPUTING/GPU ACCELERATION

AWS
CUDA/cuDNN

Projects

Real Time Joint Analysis

Motivated by past injuries, this project aimed to showcase computer vision applied to rehab analysis. Implemented a real time (4 fps) joint detection model using Detectron2. Using live feed from a webcam, displayed joint positions, angles, force and a skeleton overlay. The project also works offline, which can provide more fluid visual feedback (~30 fps)

Joint Angle Measurement

Used transfer learning on VGG16 to classify poses and a Carnegie Mellon model for pose estimation. Used 390 images for training, validating, and testing the VGG16-based transfer learning model. Utilizing CMU's OpenPose, calculated joint angles for squat pose. Classifier model performed at ~97% accuracy for validation and testing sets

Analysis on Factors Related to Diabetes

Looked into the relationships between lifestyle factors and diabetes prevalence in the U.S. Parsed 2 large (500K+ rows) datasets with info on: inactivity, lack of sleep, obesity, and fruit consumption. Visualized relationships among variables that could affect diabetes prevalence. Inactivity and lack of sleep showed signs of high correlation with diabetes prevalence which merits further analysis to answer causation

Employment

CollegeWise — Fanwood, NJ

Tutor — Oct. 2018 to Current

- Tutor students in Physics, Math, Science, English and ACT/SAT Prep
- Make lesson plans and coordinate strategies for student progress
- Teach students how to utilize TI Calculators and their programming functionality

Rutgers University — New Brunswick, NJ

Research Assistant — Sept. 2016 to May 2018

- Data acquisition for gum oxygenation prototype
- Prototype testing: Measured Fluorescent Lifetime Imaging Microscope (FLIM) accuracy
- Machine Learning & GUI development for scoliosis detection using ultrasound scans
- Manual image segmentation and data collection for bone surface localization ML model

University of Rochester — Rochester, NY

Research Assistant — May 2017 to July 2017

- Data acquisition and analysis for research in salivary gland cancer
- Analyzed effects of neurotrophic factors on cellular regeneration after cell damage
- Utilized real time qPCR analysis to measure DNA concentration and cell viability

Education

Galvanize Inc - Data Science Immersive Program — Mar. 2020 to June 2020

Rutgers University

B.S. Biomedical Engineering 2018

Rutgers University

B.S. Mechanical Engineering 2012

Awards

Galvanize Inc - **Galvanize DSI Scholarship** — Mar. 2020

Wrote an essay and entered a video teaching the concept of the derivative for the Galvanize Scholarship. Was awarded the scholarship for showcasing my motivation and vision as well as my creative abilities.

Online Public Speaking - A Day in the Life of a Galvanize Student — June 2020

Informed and motivated future data science (DS) students by sharing my experience as a DS student at Galvanize. Spoke about the support system I received, my projects, as well as my daily activities while in the course during Covid. Answered questions provided by NYC Galvanize Lead - Tim Asprec

Real Time Joint Analysis

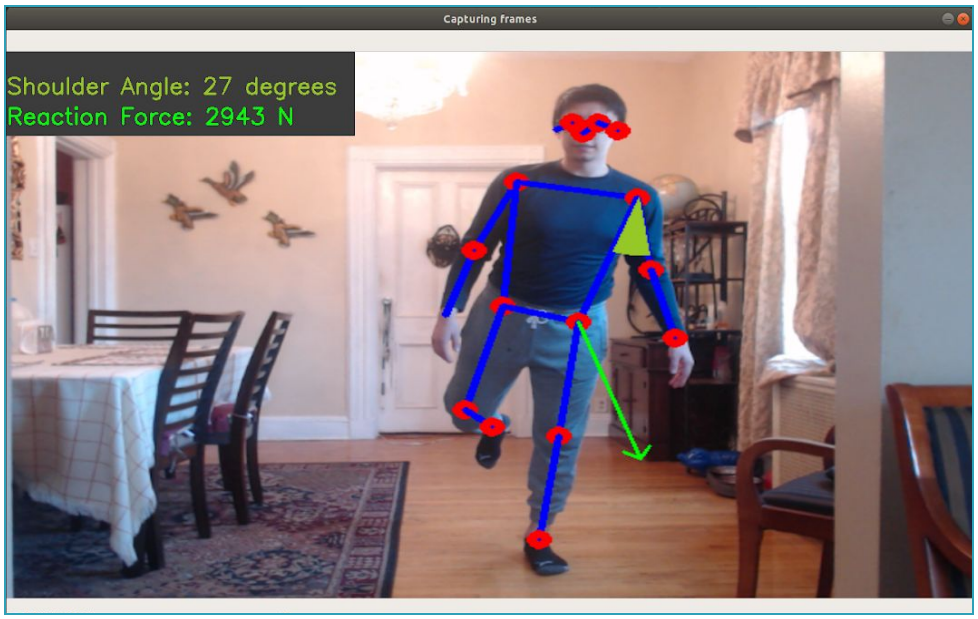
Luis Riera

Motivation

- Personal injuries limited my mobility for several years
- Limited mobility can be depressing and a personal economic burden [1] [2]
- Visual biofeedback has shown promise as a part of rehab therapy [3]

Implementation

Using Facebook's Detectron2 I developed a program that takes live webcam feed, applies 2D joint detection on each incoming frame and displays the joints and bones. I also applied some biomechanics to the hip joint and displayed the angle formed at the shoulder along with the force at the hip for visual biofeedback to the user. I am interested in helping people dealing with injuries by teaching and providing them with tools to aid their recovery process. Kinesthetic awareness is very important in human motion and reducing risk of injury



Limitations

- Low frame rate (~4 fps)
- Simple biomechanics model
- Joint detection not available for multiple people in frame

Future Work

- Implement 3D joint estimation
- Increase biomechanical model complexity
- Incorporate pose detection

1) Shafrin J, Sullivan J, Goldman DP, Gill TM (2017) The association between observed mobility and quality of life in the near elderly
2) Goldman DP et al. (2018) Long-Term Health and Economic Value of Improved Mobility among Older Adults in the United States
3) Barandasa M, Gamboab H, Fonseca J (2015) A RealTime Biofeedback System Using Visual User Interface for Physical Rehab