Mohammad-Amin Arab

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Education

Doctor of Philosophy - Computing Science   Expected: 2023
Simon Fraser University, Burnaby, BC, Canada

Masters of Science - Computing Science (CGPA: **3.8/4**)   August 2019
Simon Fraser University, Burnaby, BC, Canada

Bachelors of Science - Electrical Engineering (CGPA: **18.00/20**)   July 2017
University of Tehran, Tehran, Iran

Research Interests

Computer Vision, Image Processing, Machine Learning, Deep Learning, Remote Sensing, Hyperspectral Imaging

Experience

Network Systems Lab, Simon Fraser University — supervised by: Prof. M Hefeeda
- *Research Assistant*   Sept. 2017 – Now

- We designed a make up removal/detection system using generative adversarial networks. We showed that using shortwave infrared (SWIR) images, adding multiple loss terms to the objective function, and improving the structure of generator and descriminator improve the quality of the generated images and as a result, the accuracy of the makeup detection system.
- We designed and implemented a method to dynamically prioritize the transmission of various components of hyperspectral data based on the application needs, the level of details required, and available bandwidth. Our method jointly and optimally selected the spectral bands and their qualities to maximize the utility of the transmitted data. It also enabled adaptive and progressive transmission of hyperspectral data. We used ResNet for the processing core of the design.

Mobile Communication Systems Lab, University of Tehran — supervised by: Prof. F Lahouti
- *Undergraduate Research Assistant*   Feb. 2016 – Sept. 2016

- We design and tested a state-of-the-art coded slotted ALOHA called irregular repetition slotted ALOHA(IRSA) on universal software radio peripherals (USRPs). To test its usability, we managed to use three USRPs, one as a receiver, and two as transmitter. Then, we tested a simple version of the IRSA on them.

Selected Academic Projects

A set of machine learning projects in the statistical machine learning course
- *Statistical Machine Learning* — instructed by: Maxwell Libbrecht — grade: A^-
- Parameter learning for Naive Bayes Classifier (NBC)
- Gibbs sampling for image restoration
- Design algorithms for reliable communication in the presence of noise using loopy belief propagation

A set of image processing projects in the computational vision course
- *Computational Vision* — instructed by: Yasutaka Furukawa — grade: A^+
- Image filtering and Hough transform: In this project, we implemented some basic image processing algorithms and put them together to build a Hough Transform based line detector.
- Augmented reality with planar homographies: Here, we implemented an AR application step by step using planar homographies.
- 3D reconstruction: sparse and dense reconstruction
- Scene recognition with Bag-of-Words
- Digit recognition using CNN
- Scene recognition using deep learning

Entropy Minimization for Shadow Removal
- *Illumination in Images and Videos* — instructed by: Mark Drew — grade: A^-
- we first form an intrinsic reflectivity image based on assumptions of Lambertian reflectance, planckian lighting and fairly narrow-band camera sensors.
- Then, We find the angle for an invariant direction in a log-chromaticity space.
- After that, We show that the correct projection is that which minimizes entropy in the resulting invariant image.

- Finally, we use re-integration to recover the fully colored shadow-free image.

Implementation of a Social Network in C++
- *Advanced Programming* — grade: 19.97/20
  - Final project of Advanced Programming course. In groups of two students, we designed a social network system similar to Linkedin.com using C++, Qt, and HTML5.

Publications

M. Arab, P. Azadi, and M. Hefeeda, **Revealing True Identity: Detecting Makeup Attacks in Face-based Biometric Systems**, in preparation.

M. Arab, K. Calagari, and M. Hefeeda, **Band and Quality Selection for Efficient Transmission of Hyperspectral Images**, in Proc. of ACM Multimedia Conference (ACMMM'19), Nice, France, October 2019.

Skills

Programming: MATLAB/Simulink, Python [Tensorflow, PyTorch], and C/C++

Honors and Awards
- Graduate Fellowship at SFU— Sept. 2019
- Graduate Fellowship at SFU— Jan. 2018
- Ranked 14th among 150 more than 150 electrical engineering students and exempted from university graduate entrance exam — Sept. 2016
- Ranked 198th among more than 250000 in university entrance exam (Konkour) — June 2012

Activities
- Student Representative at ECE student council — treasurer (2015)
- Volunteered at the Open Day of University of Tehran (2014)

References
- **Professor Mohamed Hefeeda**
  - Professor and Director, School of Computing Science — Simon Fraser University
  - mhefeeda@sfu.ca
- **Professor Behnam Bahrak**
  - Assistant Professor, School of Electrical and Computer Engineering — Univeristy of Tehran
  - bahrak@ut.ac.ir
- **Doctor Kiana Calagari**
  - Former Post-doc Researcher at Network Systems Lab, Currently Machine Learning Engineer at Ever AI
  - kcalagar@sfu.ca