MedIx REU Introduction

**My code name for the survey: Toothbrush**

Goal: Promote interdisciplinary studies in computer science and medical informatics.

Note: DePaul offers a master’s research assistantship program! Check on powerpoint presentation!

* Program set up
  + Teams of 2 undergrad researchers and 1 faculty mentor
  + Virtual access to machines within the DePaul labs and UofC labs
  + 3 mentors at DePaul and 2 mentors at UofC available daily for assistance
    - Mentors have specific availability, check presentation
  + Friday afternoons are dedicated to events
  + **We will be submitting and publishing a paper by the end of the program!!**
    - Check the difference between journal and conference papers?
  + Weekly presentations on Fridays with the group
  + Google drive folder with documents linked to presentation
  + Remember to create boundaries!!
* Tips from previous students
  + Don’t worry about the uncertainty
  + Learn to read and critique papers and practice regularly
    - The more you read the better!!! Think critically
  + Don’t let zoom hold you back – talk!
  + 3blue1brown (great math youtube channel)
  + Explain your problem to a rubber duck! Will help unstuck you in a project!
  + Plan your process from the beginning – roadmap it from the start
  + ROI – regions of interest
  + Radiogenomics – how genetic mutations relate to imaging
  + Determine the best texture feature predictors!
  + Can continue to work on the project after the REU
  + Don’t stress if you don’t get your first choice project
  + Focus on communication!!!! Morning meeting and end of day meeting
  + Try not to script ourselves during virtual presentations
  + File organization!!
  + Be open to more post-graduation plans!!
  + Take breaks on weekends
  + BME and CS intersection – research labs at different universities for masters/phd programs and see what there is out there
    - Take that information and research more literature on it

Research papers

* + - Zotero!!! Use this for tracking papers and annotating them
    - Read a ton of papers at the beginning of the program to understand how technical writing works
    - Write the article throughout the program, so I am not rushing at the end
      * Maybe focus on writing a portion of it a week
* Tips from Chufan Gao
  + Improving lung nodule detection using 3d generative adversarial networks
    - Oral presentation at a conference!!!
    - SPIE medical imaging conference
  + Issue with computer vision: it is difficult to program!
  + Each point in a feature map corresponds to a section of an image
  + Input > feature maps > f.maps > f.maps > output
  + Convolutions > subsampling > convolutions > subsampling > fully connected
  + Used a 3D CNN
  + Used LIDC dataset
    - Set of chest CT scans 1018 patients
    - Didn’t train on just the LIDC dataset
  + Used data augmentation to make new data with fake data
  + GAN!! Learned to generate new human faces from existing faces
  + Generate new training examples with WGAN-GP
    - By training on augmented, fake data, they achieved much better results!!
  + Trains 2 neural networks against each other
  + Discriminator takes in data, outputs probability of being real
  + Generator tries to fool discriminator
  + You’re making a contribution to the world, no matter how small
  + How to get to grad school?
    - Letters of reference and papers!! MedIx is awesome for this! Publish paper more than once!
    - SOP – collaborate with the people here
    - GRE, grades – meet the bar!
  + For what we are interested in (fields and topics), look up the best papers and journals, see which professors publish them from what universities
    - Look for grad schools at those universities!
  + Focus on communication and collaboration more than anything else!!
  + Pick a good advisor/advisee relationship!