Michigan Technological University

Masters of Computer Science

Machine Learning,
Artificial Intelligence
Deep Learning
Data structure and algorithms

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Work experience

Working under professor **Xiaoyong (Brian) Yuan** as **Research Assistant**

Project : Mobile Security using Machine Learning

(Gestures Recognition using camera and ALS Sensor)

Working with a team of 5 members

1) Collecting the data
2) Preprocessing the data
3) Feature extraction
4) Classification Algorithms
4) Classification of different gestures
5) Plotting the graphs and analyzing the data

Skills used : Deep learning(CNN), Machine Learning, Computer vision, Libraries

UI/UX consultant

Working as a UI/UX consultant under professor **Robert Pastel.**

Collaborating on numerous real-world projects with their teams to find solutions to difficult Technological problems and help development teams accomplish their goals.

Libraries:

Numpy, Pandas, Matplotlib, Tensorflow, Seaborn, Scikit-learn, Keras, OpenCv2 , pytorch

Platform and tools:

Windows, Linux, GIT, Github, pycharm, Google Colab, Visual Studio, Advanced Excel(SQL), Anaconda, Jupyter Notebook

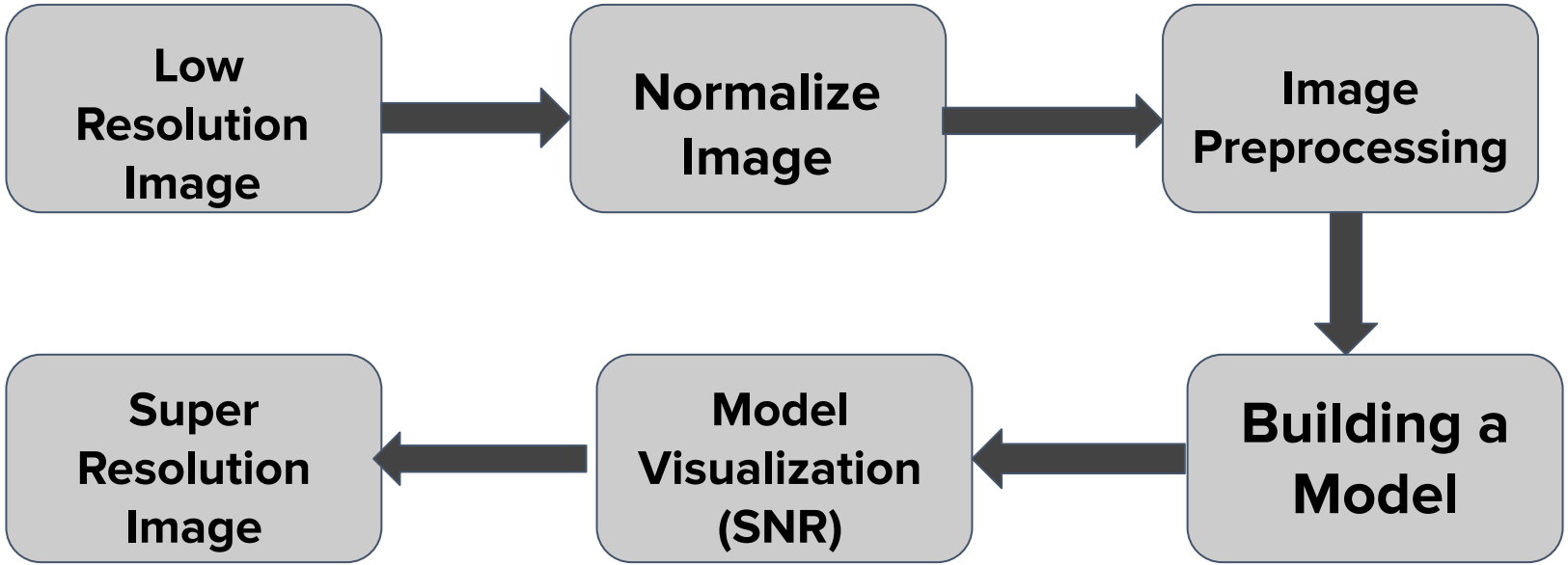
Programming Skills :

Python, Java, C, C++, HTML , CSS

Worked as Student machine learning intern

During my undergraduate I worked at IIT Bombay as student machine learning intern.
Where I worked with a team on project like
1) Image super Resolution
2) Brain tumor segmentation and classification

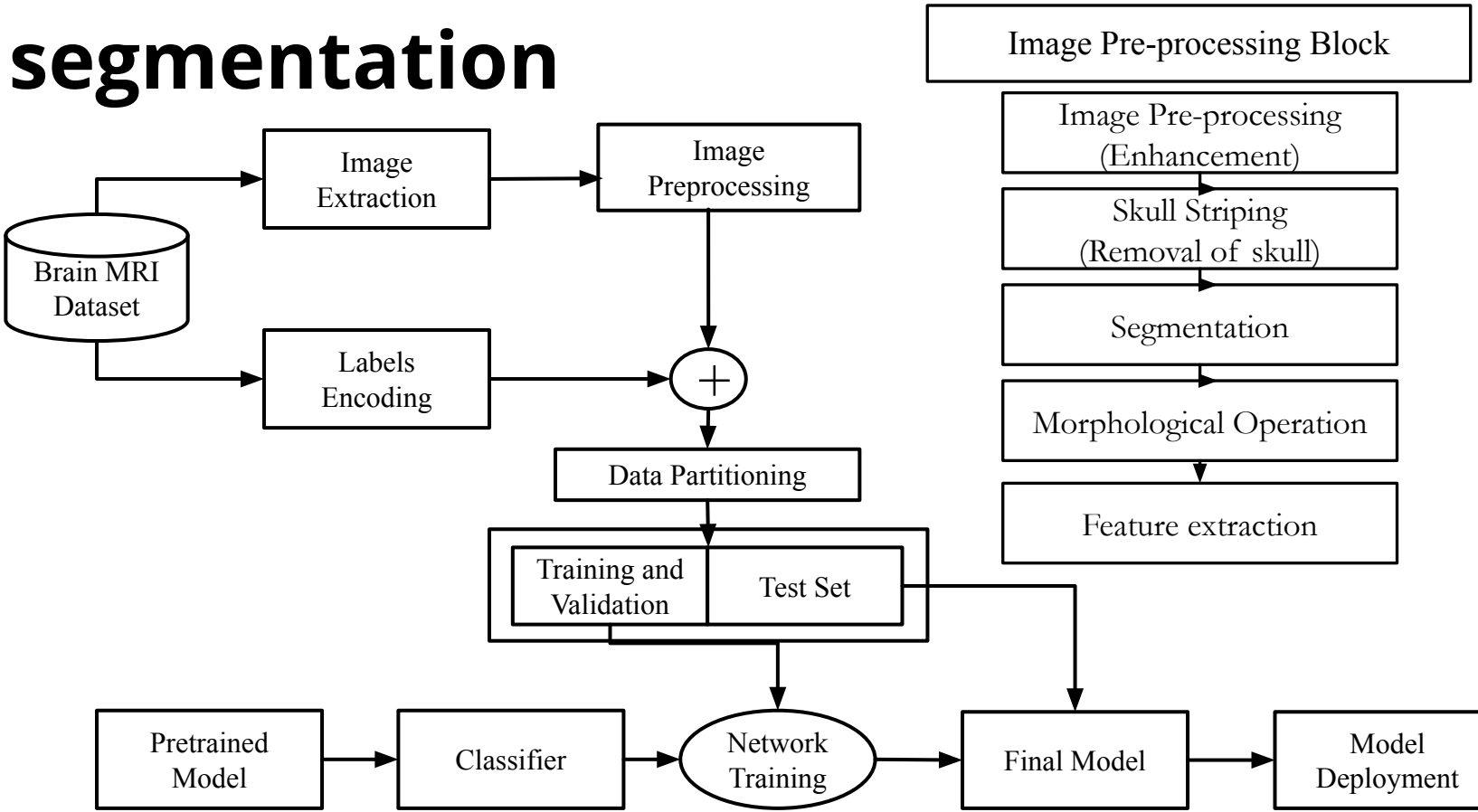
Image Super Resolution



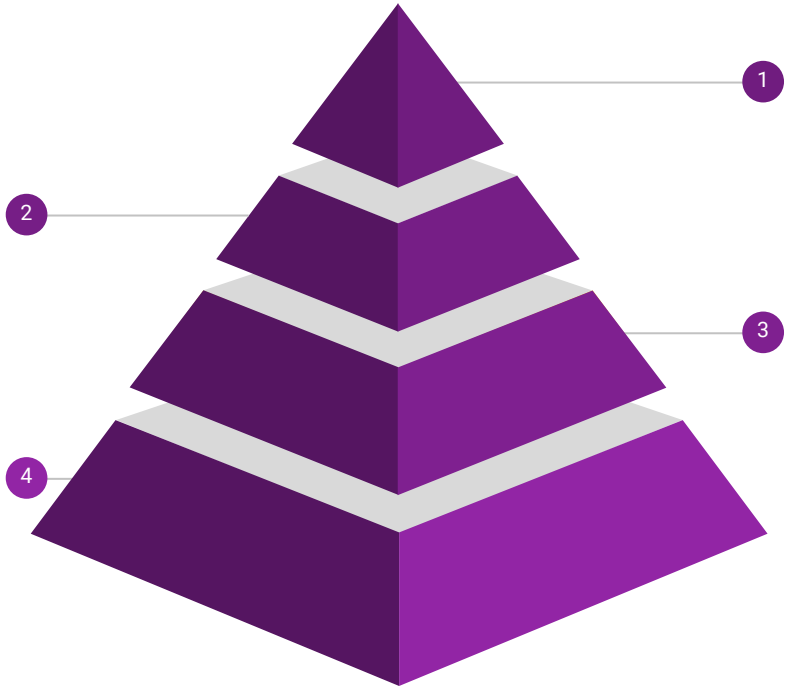
Methodology

- Used CNN based deep learning in TensorFlow framework
- Trained the model on the dataset of down sampled images as input and high resolution image as output
- YUV domain of images were used instead of RGB to make the model computationally fast.
- For the upsampling in the model, an Efficient Sub-Pixel Convolution Layer instead of commonly used Bi cubic interpolation was used after the initial convolution layers.
- After training the model, we predicted 5 up-sampled images, converted each of them back to their RGB versions and displayed them side by side with their low resolution versions and the original HR images with the Peak-to-Signal Noise Ratio (PSNR) obtained.

Brain Tumor segmentation



Music Recommendation based on emotions



Data Pre-processing
Involves Add/remove columns, Null values, Duplicates, Punctuation, Stop words, Stemming and Lemmatization

Data Transformation
Count Vectorizer, :TFIDF Transformer.

Data Splitting
Cross validation, Percentage of split, Random state

Model Selection and Conclusion
Identifying which one is best and then using that model to conclude results and then use it in future scope.

Machine Learning skills

- Understanding Tensor 1D to 5D. (Image Processing)
- Working with csv file, Json/Sql
- Preprocessing of data
- Univariant , bivariant, multivariate analysis
- Pandas Profiling

Feature Engineering

Standardization, Normalization, Handling Missing data , dealing with outliers

Algorithms

Linear Regression ,
Multilinear regression,
Polynomial Regression,
Regression Metrics
MAE, MSE, RMSE, R2 SCORE, ADJUSTED R2

Gradient Descent

Batch Gradient Descent,
Stochastic Gradient Descent
MiniBatch Gradient Descent

BIAS VARIANCE TRADE OFF

OVERFITTING (Low Bias, High Variance)

UNDERFITTING (High Bias , High Variance)

To solve the problem

1)Regularization
    a) Ridge
    b) Lasso
    c) Elasticnet
2) Bagging
3)Boosting

Machine Learning Algorithms

1) Logistic Regression
2) Decision Tree
3) Svm
4) Knn
5) Ada Boost

Classification Metrics

1) Accuracy
2) Confusion Matrix (Type 1 , Type 2 error)
3) Precision
4) Recall
5) F1 Score

Deep Learning

1) ANN
2) CNN(Image Data)
3) RNN (Speech/Text data)
4) GAN AUTO ENCODERS (Generate text/images)
5) OBJECT DETECTION AND SEGMENTATION

Pretrained Models

Image Classification : Resnet
Image Segmentation : UNET
Text classification : BERT
Image Translation : PIX2PIX
Object Detection : YOLO
Speech Generation : Wavenet

Thank You