

# SAHIL KHOSE

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## EXPERIENCE

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### Research Intern

*Artificial Intelligence and Robotics Lab (AIRL), IISc Bangalore*

*July 2021 - Nov 2021*

- Will be working on Continual Zero-Shot Learning under Dr Suresh Sundaram.
- Here's a [paper I explained](#) on relevant work

### Research Assistant

*Prof Harish Kumar: Manipal Institute of Technology*

*April 2021 - Present*

- Working on novel classification of benign and malignant cells from lung cytological images using deep convolutional neural networks

### Project MANAS

*AI Division*

*February 2019 - May 2021*

- Implemented a novel approach for a **binocular stereo** module to generate depth maps.
- Developed a **Driving Imitation System** using 3 camera sensor inputs.
- Developed a **Speed Bump Detection** module using camera and 3-D LiDAR data.
- Developed a **Lane Detection** module using camera to work for robust lighting conditions.

## PUBLICATIONS

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- *BERT based Transformers lead the way in Extraction of Health Information from Social Media:* available on [aclweb](#) and [GitHub](#), published in proceedings of **SMM4H 2021** hosted by **NAACL**.
  - The classification system **ranked first** among all submissions for subtask-1(a) at the **Social Media Mining for Health (SMM4H) 2021** workshop co-located at **NAACL 2021**
  - Developed and trained a system to classify tweets that contain adverse drug effect. Built the pipeline and trained **RoBERTa** and **BioBERT** architectures for this task. **RoBERTa** achieving **61% F1** on the test set got the **best results** on the competition leaderboard.
  - Trained **Named Entity Recognition** model to detect the span of these mentions achieving **50% F1** on the test set **ranking 2nd**.
  - Developed and trained a system to classify tweets containing COVID-19 symptoms mentions. Built the pipeline and trained **RoBERTa**, **BERTweet**, **DeBERTa** and **Covid-Twitter BERT** along with majority voting. **BERTweet** performed the best with **94% F1** on the test set **ranking 2nd**.
- *Semi-Supervised Classification and Segmentation on High Resolution Aerial Images:* available on [arXiv](#) submitted to **EARTHVISION 2021** workshop hosted by **CVPR 2021**.  
[Demo](#) and [GitHub](#)
  - Implemented and trained a **semi-supervised classification** system to classify 3000x4000x3 dimensional aerial images into **Flooded or Non-Flooded** classes with very limited labeled data. **ResNet18** fetched us test accuracy of **96.70%** which beats the best model of the FloodNet paper by **3%** with less than **half the parameters**.
  - Implemented and trained a **semi-supervised multi-class segmentation** system which segmented **10 classes** from the aerial images. **DeepLabv3+** with a **EfficientNet-B3 backbone** fetched us **52.23% mIoU** on the test set.

- Both semi supervised approaches use the generation of **pseudo labels** during training and slowly **increasing the amount** by which the pseudo label loss affects the final loss.

## PROJECTS

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### StackGAN for text to image generation [\[GitHub\]](#)

*Oct 2020*

- Implemented and trained the **StackGAN** paper from scratch in PyTorch to generate 256x256 high resolution images of birds (CUB dataset) using only their text description.
- **Stage-1 GAN** sketches the primitive shapes and colors of the bird based on the text description.
- **Stage-2 GAN** takes Stage-1 results and text descriptions as input and generates high resolution images with photo realistic details.

### QANet for SQuAD 2.0

*Sep 2020*

- Built a system to solve the **SQuAD 2.0** Question-Answering dataset. Implemented the **QANet** paper from scratch in PyTorch, the architecture consists exclusively of **convolution and self-attention**, where convolution models local interactions and self-attention models global interaction.
- The **context and question** are passed through independent stacked **embedding encoder blocks** followed by **context-query attention** which combines the 2 branches. This is followed by multiple stacked **model encoder blocks** which send their output to 2 different branches which predict the **start and end** probability of the answer in the context.

### Stock Prediction using Hyper Graphs

*Aug 2020*

- Developed a **hypergraph** structure based dataset, modelling the relationship between 500 stocks of the S&P 500 index using the daily news from Reuters News dataset. The nodes specify the stocks and the hyper-edges contain **BERT embeddings** of the news articles mentioning multiple stocks in a day.
- Built a **Hypergraph Neural Network** based architecture in PyTorch which takes these generated hypergraphs as input. Hypergraphs over multiple days were passed through this network and fed into a **LSTM** layer which is followed by **attention and residual layers**. Finally the output was passed into a **shared classifier** which predicted the stock prices of all 500 stocks of the index.

### Neural Machine Translation [\[Demo\]](#) [\[GitHub\]](#)

*July 2020*

- Built and trained a Neural Machine Translation system from scratch in PyTorch.
- It uses a **Bidirectional LSTM Encoder** and a **Unidirectional LSTM Decoder** using Seq2Seq network with **attention** and hybrid character-level and word-level language modelling.
- Achieved **37 BLEU** on Spanish - English translation task.

## ACHIEVEMENTS

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- Contributor to the Project MANAS team which stood **World Rank 1** at the 27th Intelligent Ground Vehicle Competition (IGVC 2019) which is held at Oakland University Michigan, USA.
- Contributor to a team which **ranked first** among all the submissions for subtask-1(a) at the **SMM4H 2021** workshop which is co-located at **NAACL 2021**.
- Secured an **All India Rank 19** in the Flipkart GRiD 2.0 - level 1 in a team of 3 members.
- Secured **Rank 1** in Google Hash Code 2020 in Manipal hub, ranked 500 in India in a team of 4.

## TECHNICAL SKILLS

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<b>Programming</b>	Python, C++, Java, C
<b>Libraries &amp; Tools</b>	PyTorch, NumPy, OpenCV, Matplotlib
<b>Experienced in</b>	Natural Language Processing, Computer Vision, Deep Learning

## EDUCATION

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<b>Manipal Institute of Technology</b>	Manipal
Bachelors in Technology	<i>2018 - 2022</i>
<a href="#">Computer and Communication Engineering</a>	<i>CGPA: 8.37</i>