ANURENDRA KUMAR

Email : anu.ankesh@gmail.com ◇ Mobile : (+1)-2178198065 ◇ Webpage

RESEARCH INTEREST

Machine Learning; Explainable Artificial Intelligence

EDUCATION

University of Illinois at Urbana-Champaign *Aug '19 - May'21*
M.S., Computer Science GPA: 4/4
Indian Institute of Technology (IIT), Kanpur *Jul '12 - May '17*
M.Tech, Electrical Engineering GPA: 9.67/10
B.Tech, Electrical Engineering GPA: 8.0/10
Minors in Artificial Intelligence, Linguistics

WORK EXPERIENCE

Graduate RA, Prof. Kevin Chang, UIUC *Aug'19 - Present*
Web Information Extraction [Link]

Developed a large dataset and a novel scalable deep learning architecture for web information extraction. Inspired by the recent advances in CV and NLP, we propose a self attention based architecture for optimal contextual learning. The proposed model is promising because it is optimized to exploit visual features from semi-structured data eg. webpage.

Lead, Data & Artificial intelligence, Startup Project *Jan'18 - Mar'19*

[NDA restricted] Developed and validated machine learning algorithms for futuristic finance services. My work included- i) Designing statistical framework for risk assessment and mitigation in our platform, ii) Modeling and prediction of time-series data when very less training data is available, iii)Explainability of machine learning algorithms.

Research Intern, IBM Research Lab *Jun'17 - Aug'17*
Hierarchical sparse representation of Knowledge base(KB) [Presentation]

Developed an algorithm for representation learning of KB exploiting the existing tree structured hierarchy.

Extreme Blue Intern, IBM *May'16 - Jul'16*
Internet of Things (IOT) in Agriculture [Video]

Developed the prototype for precision agriculture in India. Our foundational work later developed into full fledged system and won the prestigious **AEGIS GRAHAM BELL AWARD** .

Research Associate, IIT Kanpur-ISRO Collaboration *Aug'17 - Dec'17*
Remote sensing image quality evaluation [Presentation]

Developed a no reference metric for quantifying the remote sensing image dynamics using dictionary learning.

Research Intern, Samsung *May'15 - Jul'15*
Data Science Intern, Rivigo *May'19 - Aug'19*

PUBLICATIONS

A. Kumar, T. Guha, P. Ghosh, 'A Dynamic Latent Variable Model for Source Separation', Int. Conf. on Acoustics, Speech and Signal Processing (**ICASSP**'18) . [Link]

Developed a novel latent variable model for time-varying non-negative data. Proposed a novel prior distribution which is particularly suitable for dynamic non-negative data. It also lead to connecting our model to the two popular latent basis learning methods - PLCA and NMF.

A.Kumar, T.Guha, P.Ghosh, 'Dirichlet Latent Variable Model: A Dynamic Model Based on Dirichlet Prior for Audio Processing', **IEEE Transaction** on speech and language processing (2019) . [Link]

Extended above model to incorporate multi-order bidirectional dependency and to newer applications.

L.Pandey^{+}, **A.Kumar**$^{+}$, V.Namboodiri, 'Monoaural audio source separation using variational autoencoders', **Interspeech**'18 . [Link] (+ denotes equal contribution)

Proposed a principled generative approach using variational autoencoders (VAE) for audio source separation. VAE computes efficient Bayesian inference which leads to a continuous latent representation characterizing each source. Our method performed better than best of the relevant methods with 2 dB improvement in the source to distortion ratio.

TECHNICAL SKILLS

Strong: Python, Pytorch, Matlab, Latex
Medium: C, C++, R, Javascript, Tensorflow, Caffe

SHORT PROJECTS

Multiple Word Vector Embedding for polysemous words *Sep' 15 - Nov'15*
Prof. A. Mukherjee, IITK [Project Material]

Extended word vector model to have multiple representations for polysemous words. Our primary contribution was in developing a non-parametric approach to clustering for optimal number of senses.

Automatic wheat grain quality estimation *Aug'16 - Nov'16*
*Prof. T. Guha, IITK (**Best project** in Image Processing course)* [Report]

Developed a proof-of-concept for quality estimation of grain from the image of a grain sample. Created a labeled data-set with the help of traders and farmers. Proposed a novel segmentation algorithm followed by classification.

Visual Odometry in Self-Driving Car *Sep'15 - Nov'15*
Prof. G. Pandey, IITK [Project Material]

Developed and implemented visual odometry in self-driving car using opencv library in C++. SIFT and FAST features were extracted in each frames. KLT tracker with RANSAC for outlier rejection was employed for tracking features.

Video segmentation *Jan'16 - Apr'16*
Prof. V. Namboodiri, IITK [Project Material]

Improved graph-based hierarchical segmentation in videos for both the online and offline segmentation.

Multiple Kernel Learning (MKL) *Sep'15 - Nov'15*
Prof. H. Karnick, IITK [Project Material]

Implemented and performed experiments to show that MKL automatically learns the efficient weighted distribution of multiple kernels and have the potential to handle data coming from heterogeneous sources.