

## SenSIP Seminar Series

### Domain Adaptation and Subspaces: Exploiting Geometry for Robust Machine Learning

Presenter: Kowshik Thopalli

PhD Student

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#### Abstract

Despite significant advances in neural network architectures and optimization strategies for supervised learning, one of the long-standing challenges has been to effectively generalize classifier models to novel testing scenarios, typically characterized by unknown covariate shifts changes in label distributions, or oblivious corruptions.

In this talk, I will present our work on exploiting data geometry to improve the performance on the problem of unsupervised domain adaptation (UDA). In UDA, the goal is to utilize labeled data from a source domain to design a classifier that can generalize to an unlabeled target domain. I will specifically talk about our paper “Multiple Subspace Alignment Improves Domain Adaptation” where in we develop a method to effectively represent the source and target datasets via a collection of low-dimensional subspaces, and subsequently align them by exploiting the natural geometry of the space of subspaces, on the Grassmann manifold.

I will then proceed to talk about our next work, “SALT: Subspace Alignment as an Auxiliary Learning Task for Domain Adaptation” wherein the core idea is to consider alignment as an auxiliary task to the primary task of maximizing performance on the source. The auxiliary task is formulated by assuming a tractable data geometry in the form of subspaces. This unique fusion of geometric and model based alignment with gradient-flows from a data-driven primary task performs similar to or better than the state-of-the-art on multiple standard benchmarks.

#### Biography:



Kowshik Thopalli is a PhD student in the Geometric Media lab in Arizona State University under the guidance of Dr. Pavan Turaga. He is also mentored by Dr. Jayaraman Thiagarajan and Dr. Rushil Anirudh. He received his Masters from School of Electrical and Computer Engineering, ASU. He also had a chance to intern at Lawrence Livermore National Laboratories in the summer of 2018 and at SRI International in the summer of 2019. Kowshik's main research interest is in the field of computer vision. He is interested in developing solutions towards robust machine learning by leveraging from the vast and beautiful theories of Differential Geometry and Optimal Transport.

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