Please attend the PhD proposal defense of Piyush Sharma, a PhD candidate in Applied Mathematics and an advisee of Dr. Gary Holness. His proposal defense will be on:

Advisor: Dr. Gary Holness

Title: *Finding a Suitable Model for Novel Data Using Range Transformation*

In the age of increasingly pervasive sensing applications the measurement of unknown pattern phenomena from novel data presents a challenge to selection of appropriate modeling tools. Typical practice dictates understanding regularities in the data, understanding capabilities and properties of models, and selecting models that most appropriately identify and express regularities in data. Because there is not a rich history of domain knowledge arising from novel datasets, one is left with modification of reasonable models. A reasonable model would capture the limited known aspects of the physical system underlying the novel data. Given limited ability to select the notion of a best model, a natural question concerns if there is a generally applicable way to alter models to better suit novel data. A model is a function that maps inputs derived from data to a range. By focusing on transformations of model's range, we have found a generally applicable way to change the model's properties to best suit the data. Examples of transformations may preserve relative distances, or change relative distances between elements of range. These include monotonic transformations, dilation, anisotropic dilation, rotation, scaling, stretching, projection, etc. This work makes several contributions by introducing a range transformation approach for finding a suitable model, a family of information theoretic measures, a family of information theoretic kernels based on information between two distributions, investigating underlying mathematical properties of the modified model, and an optimization approach for finding a suitable model.

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