Predictive Analysis of Weather Data via Diffusion Maps, Spectral Clustering, and SOMETHING

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**Abstract**—Weather analysis

**Index Terms**—Stochastic Differential Equations, Diffusion Maps, Spectral Clustering, Weather, Data

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# 1 Introduction

Weather analysis and forecasting is a discipline that has been at the forefront of human curiosity since the time of the Babylonians [1].

## 1.1 Diffusion Maps

Diffusion maps are a dimensionality reduction technique which is beneficial in data analysis due to its applicability to nonlinear data. Additionally, diffusion maps are commonly used to discover underlying properties of a data set that would not necessarily be revealed by other dimensionality reduction techniques [2]. **More here?**

The first step in implementing a diffusion map is to develop a kernel. The kernel acts as a measure of similarity between two data points and is often denoted as follows [3]:

The measure of “similarity” between two data points can be defined in a variety of ways. A common similarity measure is Euclidean distance in instances where data points can be described in terms of their coordinates in a Euclidean space . However, sometimes overall similarity should account for other data attributes such as color of pixels in an image [4].

## 1.2 K-Means Clustering

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## 1.3 Predictive Analysis

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# 2 Methods

## 2.1 Development of Python Model

A Python script was developed to p

The kernel developed for this model is the same as that developed by Farbman et. al. [4]:

*)* (1)

where is a scaling parameter, and are data points.

## 2.2 Efficiency Improvement

Also drawn from the Farbman et. al paper [4], is a well-known efficiency improvement that can be implemented via the Nyström approximation.

# 3 Results

# 4 Results

Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extensions. Authors are strongly encouraged not to reference multiple figures or tables in the conclusion—these should be referenced in the body of the paper.

**Acknowledgment**

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**References**

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Fig. 1. Magnetization as a function of applied field. Note that “Fig.” is abbreviated. There is a period after the figure number, followed by one space. It is good practice to briefly explain the significance of the figure in the caption.