1. Introduction

Our mission: We propose a strategy to leverage big data for commercial alpha. We transform NASA nightlights data into a predictive feature and reveal insights about the economy earlier than large financial firms. Our resulting models forecast stock market activity to reveal hidden investor insights.

Method: We mask major cities in India and the US, encode the images as vectors and combine those with economic indicators to forecast stock market activity.

This dataset aggregates satellite images of the nighttime sky over the course of a month and contains over 300 GB of data.

NASA Nightlights Exploration for Early Business Insight

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3. Data Masking

NASA tile H10V04 contains Boston, which is a third of the size of the grid square. In the future, we could crop a ragged outline of the city, to more closely capture its nightlights.

Computing the total luminescence over time for the cities in question reveals the following trends.

4. Modeling

Our system encodes images as vectors and forecasts those vectors into the future. Then, it combines forecasts with economic indicators to produce predictions and decodes the vectors back into images of future nightlights.

4. Data Transformation

Exploratory data analysis revealed that NASA fills values for bad quality data or if the solar zenith angle <108°. So, we re-scaled the values to reveal luminescence as shown in the following figures.

2. Dataset

VNP46A3 - VIIRS/NPP Lunar BRDF-Adjusted Nighttime Lights Monthly L3 Global 15 arc second Linear Lat Lon Grid

5. Results

Our system succeeds in producing commercial alpha using city nightlights as a feature. Each of these plots shows our 6-months-ahead predictions of cities’ economic activity.

6. Acknowledgements

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7. References