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Insight 1

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I found the article on Nature entitled “Using Publicly Available Satellite Imagery and Deep Learning to Understand Economic Well-being in Africa” to be extremely interesting because the data and methods used in this research were in my opinion unique. Since access to or the existence of economic data is relatively limited for many parts of Africa, the researchers used some creative datasets and intriguing data science methods to predict and understand economic well-being in these areas. The researchers used imagery data of these areas for most of their analysis – these data could provide a good indication of the areas’ economic well-being. High resolution imagery of about a meter per pixel and nighttime light imagery with a resolution of one kilometer per pixel were the two main imagery sources they analyzed for space-time trends. It seems that nighttime light imagery over time is actually a surprisingly good indicator of a country’s economic standing. I predict that this is because nighttime lights are usually associated with cities; thus, more night time lights probably means more urbanized areas, which could be related to a better economic performance. The high-resolution imagery on the other hand can show progression of buildings and construction, which means the economy of an area may be expanding.

The researchers trained a convolutional neural network for the analysis portion of the research, and found that the CNN was “able to explain 70% of the spatial variation in ground-measured village-level asset wealth across Africa, and up to 50% of temporal variation when

aggregating to the district level.” The main goal of using a convolutional neural network (or the other data science methods they used, like K-Nearest Neighbors) was to implement an unsupervised learning method to come up with certain features from the imagery data that could be associated with asset wealth. One part of this research that I found incredibly interesting was that the researchers implemented a “transfer learning approach”. This approach analyzed the nighttime data as an intermediate step, which was in turn used to find corresponding areas/features in the Landsat imagery that are relevant to economic well-being. This “transfer learning approach” is something I had never heard of, and I found it interesting that one dataset could be used to jumpstart the analysis of another.

Overall, the results from this research seem to achieve their intended purposes. Learning tactics like transfer learning combined with imagery data (particularly the nightlight data - the relevancy of that data surprised me) allowed the researchers to model economic well-being in areas where that data simply isn’t collected often, or even at all. While the modelling approaches may not be anything necessarily “new”, I still find this application of machine learning/deep learning to be not only interesting but vital in the sector of imagery analysis. Imagery analysis has a lot of untapped potential, and projects like this highlight the extent of the possibilities with it.