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Poverty Prediction Deep Learning Model

Proposal

I am working with Professor Jeova Farias on the "Poverty Prediction Deep Learning Model" project. Our objective is to develop a deep learning model based on computer vision that leverages satellite imagery to estimate poverty levels in remote South American communities. This approach allows us to measure poverty in regions traditionally challenging to assess. Utilizing satellite images, we aim to accurately predict poverty levels globally.

Focus

Our proposed model diverges from the conventional computer vision deep learning models, which analyze individual pixels and their immediate neighbors. Instead, our model will explore the relationships between centered pixels and various points of interest to forecast poverty levels. This method introduces a novel convolution technique, potentially offering more precise poverty predictions. The model will consider not only the immediate neighbors but also nearby structures and landmarks as points of interest within the satellite images, enhancing the traditional image recognition process.

Methodology

The summer research will focus on developing and testing this model, eventually integrating it into the broader "Poverty Prediction" project. The project spans 8 weeks, with the initial two week dedicated to implementing the standard deep learning image classification models and introducing our new approach. Weeks three and four will involve preliminary testing on simple datasets to ensure model functionality and training efficiency. In the fifth and sixth weeks, we will compare our new method against the conventional approaches, aiming to merge the most effective elements into a unified model that takes account both models. The final two weeks will be dedicated to documenting our findings and sharing the developed code on GitHub, contributing to the project's ongoing efforts. Professor Farias and I will maintain three times per week meetings for progress checks and mentorship throughout the summer. Meeting frequency may adjust according to project needs and challenges encountered.

Preparation

In preparation for this research, I am dedicating personal time this semester to deepen my understanding of deep learning techniques and the project details through a bi-weekly meetings with Professor Farias.

As a second semester sophomore, I am planning to pursue a major in Computer Science and a minor in Mathematics. This research with Professor Farias is pivotal for my academic growth in both subjects. It intertwines deep learning's computational and mathematic aspects, aligning with my academic journey at Bowdoin. My computer science journey at Bowdoin with no prior knowledge in programming. Since then, I have completed Intro to Computer Science, Data

Structures, Algorithms, Artificial Intelligence, and Software Engineering. In addition, I have been working as a research assistant at the Lexicon Lab with Professor Abhilasha Kumar for a year and a half, working on projects related to cognitive science and psychology. The projects explore how people organize and retrieve information from their memory using computational models. The primary programming language used is Python, with a focus on data science tools. My experience in the Lexicon Lab will be beneficial for the deep learning model project as I have experience in the Python tools that we will be using to develop the deep learning model. Currently, I am wrapping up on the research project "Structure and process-level lexical interactions in lexical interactions in memory search: A case study of individuals with cochlear implants and normal hearing", in preparation for submission to the Cogsci 2024 conference.

Future

Collaborating with Professor Farias presents an amazing chance to apply the skills and knowledge I've acquired at Bowdoin to practical, real-world challenges. This experience will enrich. My understanding of computer science research, particularly in Artificial Intelligence and Machine Learnings. As I aim to pursue postgraduate studies in computer science with a specialization in AI and ML, this summer research opportunity provides me with invaluable experience and serve as a foundation for my future academic opportunities.