MODELING, VISUALIZATION AND ANALYSIS OF AFRICAN INNOVATION PERFORMANCE

INNOVATION BAYLASAN

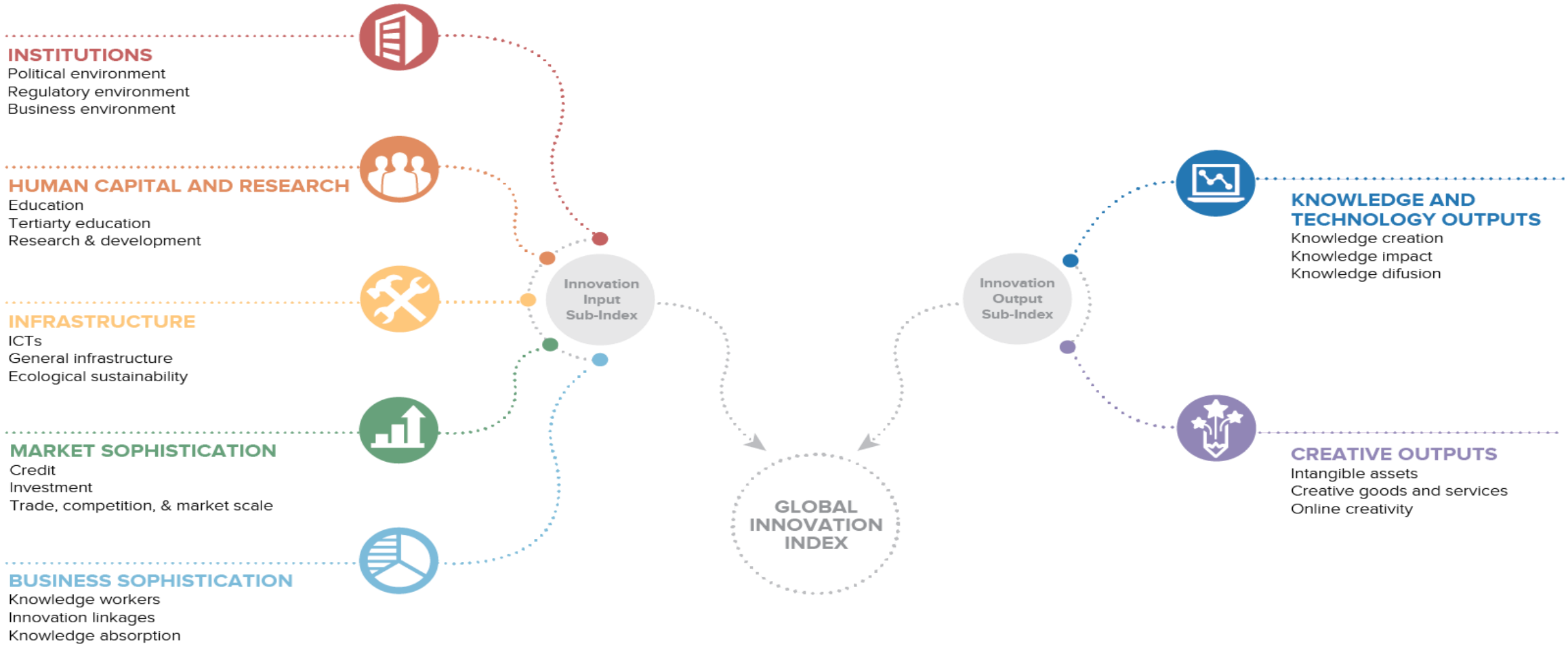
WHAT IS INNOVATION BAYLASAN

In **INNOVATION BAYLASAN,** our vision is to make production innovation the main theme for all of the development efforts in Sudan as well as in the continent as a whole.

We are interested in three aspects of production innovation that we believe are the most essential: Agricultural Production Innovation, Industrial Production Innovation, and Knowledge Production Innovation.

This work was carried out by the Knowledge Production Innovation team at Baylasan, who are: Muhammad Omer, Moayad El-Amin, Ammar Nasr, and Rami Ahmed.

GLOBAL INNOVATION INDEX LAYOUT



PROBLEM STATEMENT

The problem with the existing global innovation index data is that many African countries have missing evaluation points, which leads to uncertainty when trying to address the current status quo of innovation in the continent.

Also, at our first moment of interaction with this data, we assumed that it most probably understates the efforts and activities related to innovation in Africa, for example, regarding mobile app development and the software engineering market.

These factors above affect to great extents actions to be made by decision make whether government officials, international organization (UN, IMF..etc), and other stakeholders (for example FDI).

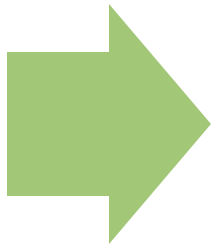
METHODOLOGY

We use data from the Stackoverflow annual developers survey to get better insights on the software development market in each country and test whether these insights can help predict the **mobile app creation evaluation** criteria on the global innovation index data, and eventually build a number of models (Gaussian Processes, XGBoost, Random Forests, SVM) to choose from and interpolate with.

Then we build multiple models(Gaussian Processes, XGBoost, Random Forests, SVM) using African countries profiles for the last five years, and use the interpolation above for the missing data from the mobile app creation column, and finally compare between these models using root mean squared error.

RESULTS

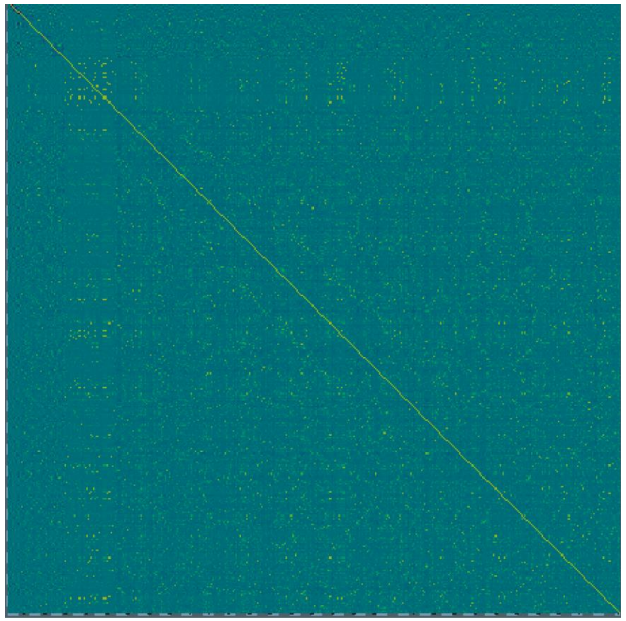
For the Mobile App Creation prediction, it was found that the data collected from the surveys are weakly correlated with the indicator, which has resulted in the weak performance of the models, except for the Gaussian Processes model which performed best performed best, and we decided to use to interpolate in the next step.



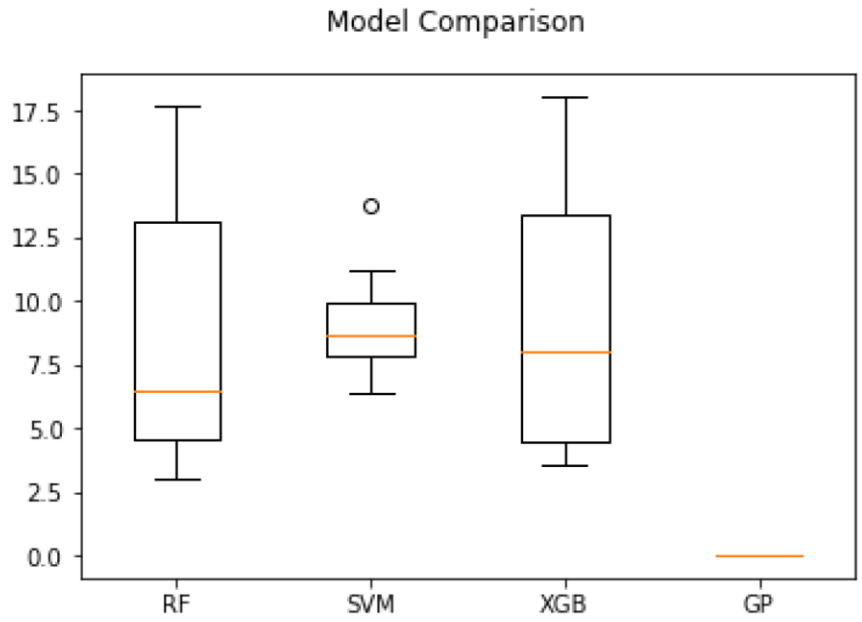
These poor results, come from the fact that the Global Innovation Index employs a top-bottom approach in the way it collects its data to compute the indicators. For the Mobile App Creation case in particular, it uses ”Global downloads of mobile apps, by origin of the HQ firm, scaled by PPP$ GDP (billions)”. This approach explicitly eliminates local innovators, especially those in developing countries who mostly exist as freelancers, social enterprises, or early stage start-ups.

RESULTS

Developer's Survey and Global Innovation Index Data Correlation Map



Models Comparison for Mobile App Creation Interpolation



RESULTS

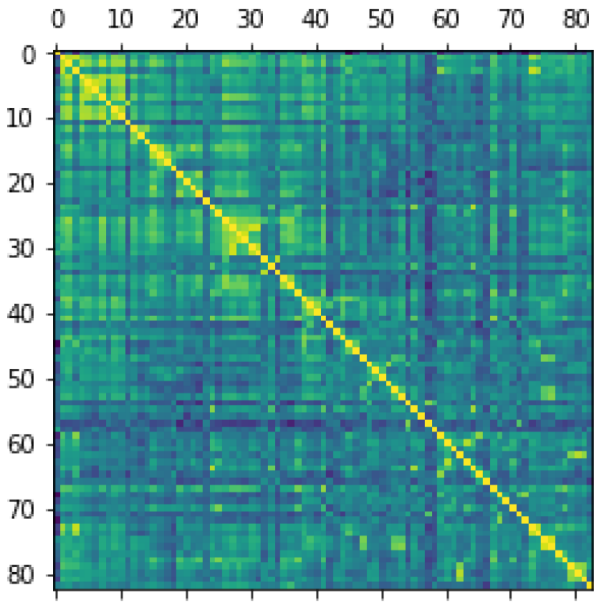
As for the African countries data set, output of the correlation matrix showed that there is a direct positive correlation between Regulatory Quality of a country and its Innovation output sub-index, meaning an active role of government can lead to a healthier innovative environment and therefore better innovation overall.

Another positive correlation appeared between the Innovation Output sub index and Governments online service and also with Rule of law continuing the apparently needed state sponsoring of innovative friendly policies for acceleration to show in innovation.

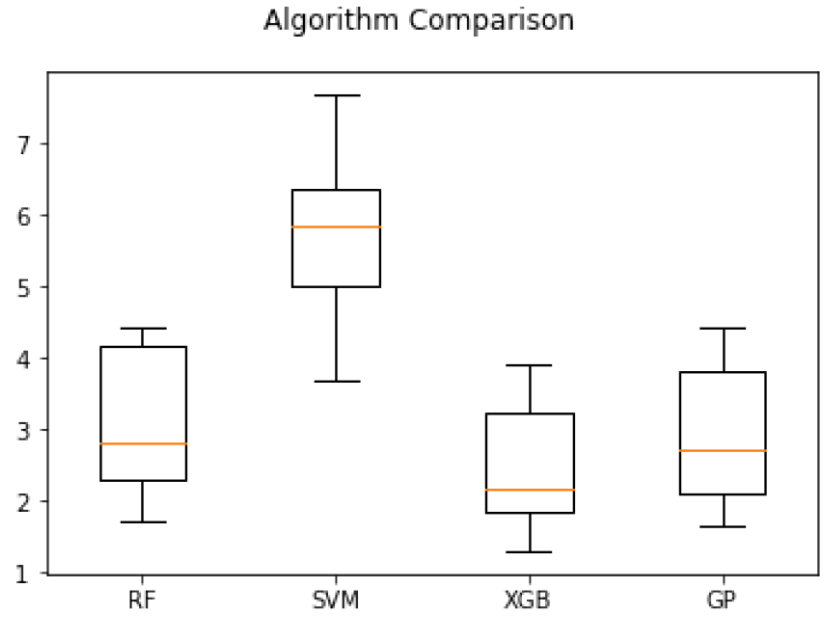
The models performed relatively very good, with XGBoost being the dominant with no surprise.

RESULTS

African Countries GII profiles Correlation Map



Model Comparison on Predicting the Innovation Output on Africa's Data



CONCLUSION

- In this paper, we outlined the need to use alternative data sources to better measure innovation performance in the continent, as well as the need for grassroots movements to foster and facilitate innovation in Africa. We also showed how simple machine learning techniques can provide novel insights for this matter in question, and finally, a number of observations considering African innovation performance and recommendations to better facilitate innovation and creativity in Africa.

THANK YOU

MHMDGAFFAR98@GMAIL.COM