

✧ Malaria Prediction with Remote Sensing ✧

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Contrastive Learning of Satellite Image Embeddings for Malaria Prevalence Prediction in Africa

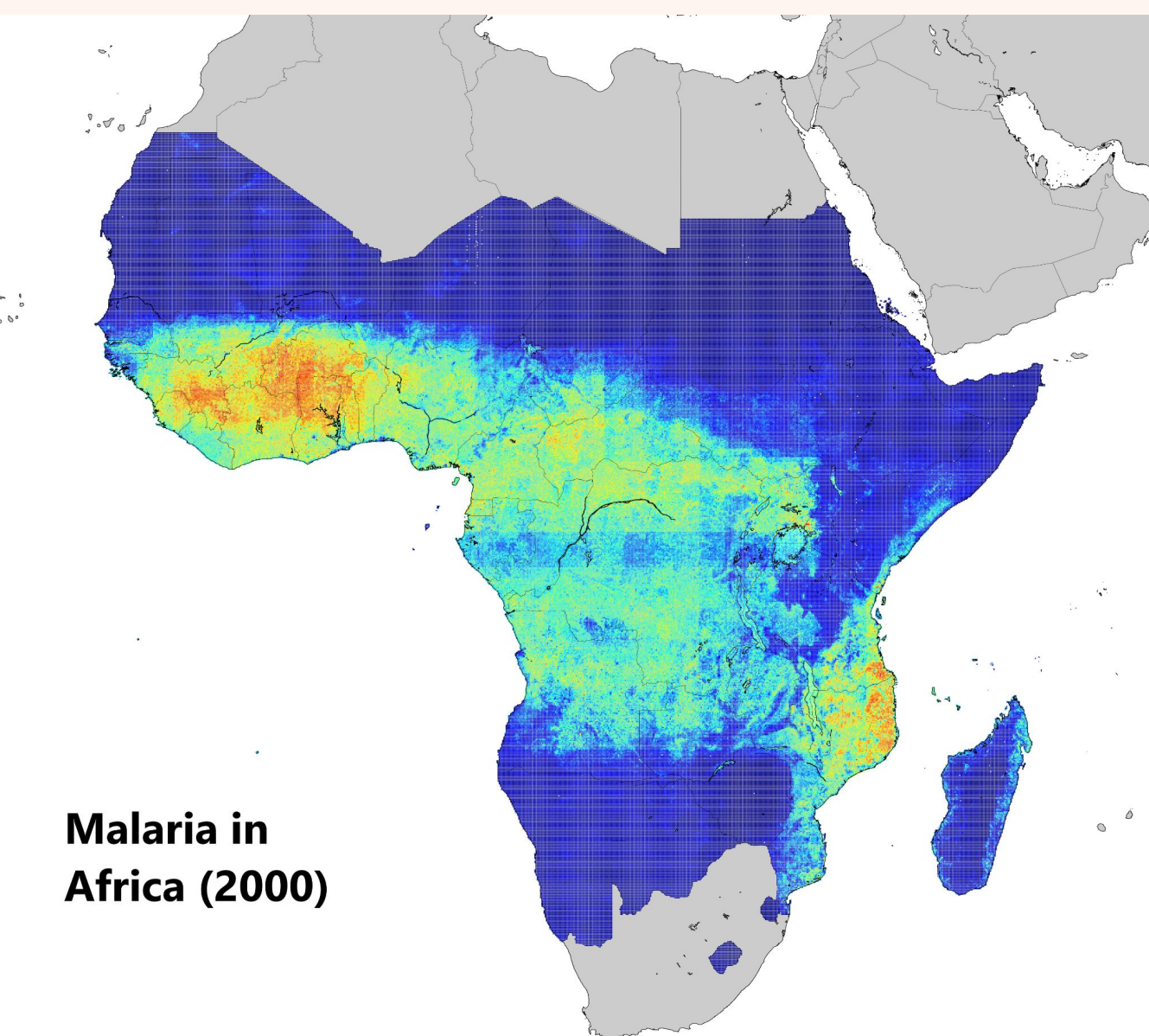
Introduction

Abstract

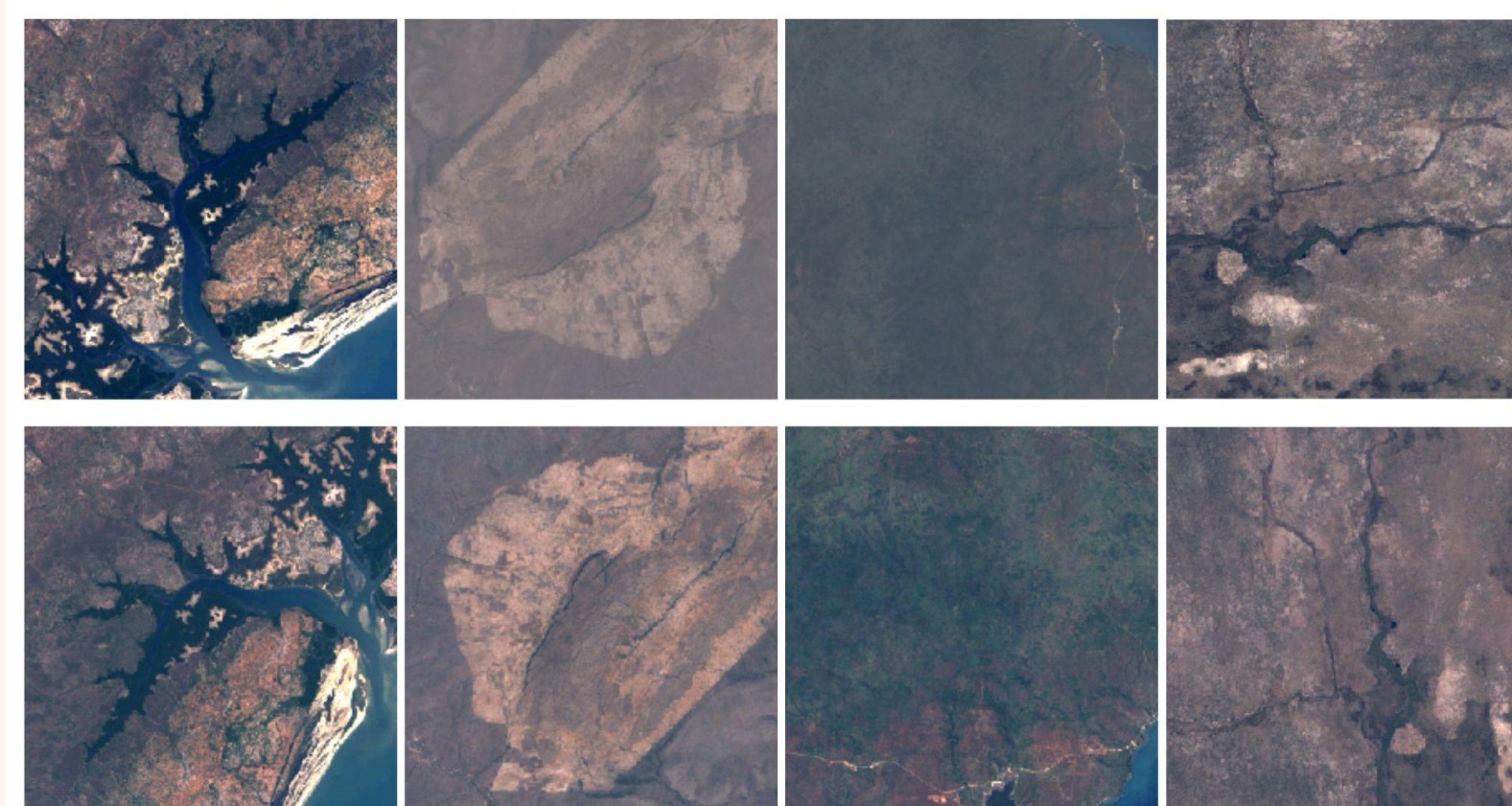
In 2021, there were 247 million malaria cases globally, with the majority of cases in sub-Saharan Africa. Using remote sensing combined with unsupervised deep learning techniques can help effectively predict the prevalence of malaria, using geographical features like forest cover, proximity to water, urban density and much more. With the help of contrastive learning, we can follow the trend of malaria in Africa over three decades.

Themes- *Contrastive Learning, Malaria, Remote Sensing*

Malaria Prediction 2000



Data



Top: 2 contrastive augmented views of Landsat 7 satellite images. Contrastive geometric and colour augmentations were used.

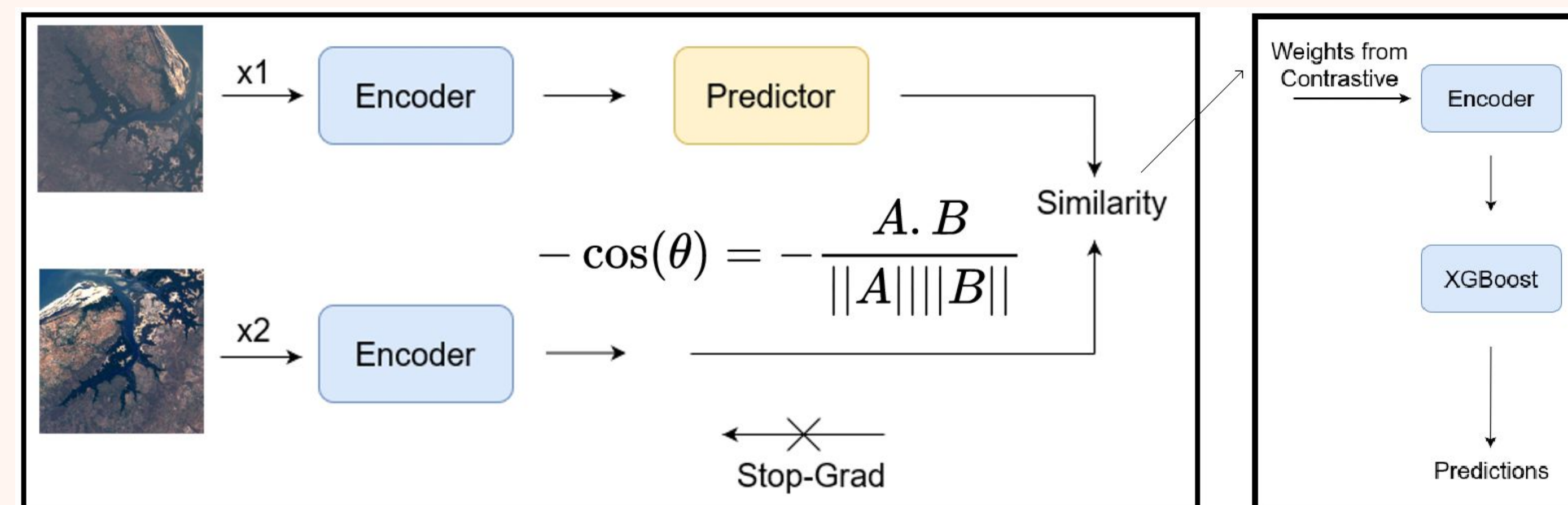
Methodology

Models

Contrastive learning compares two representations of the same Landsat 7 (LS7) satellite image to learn features effectively in an unsupervised step using Convolution Neural Networks (CNN).

Then, an xGBoost model is used to predict the prevalence of malaria in Africa against Demographic and Health Surveys (DHS), using the geographical image features learned from the contrastive step for three decades, 2000, 2010 and 2020.

Bottom: Malaria prediction system. Contrastive Step learns similarities between with 2 augmented views using a cosine similarity loss function. The features are passed to the xGBoost model to make predictions.



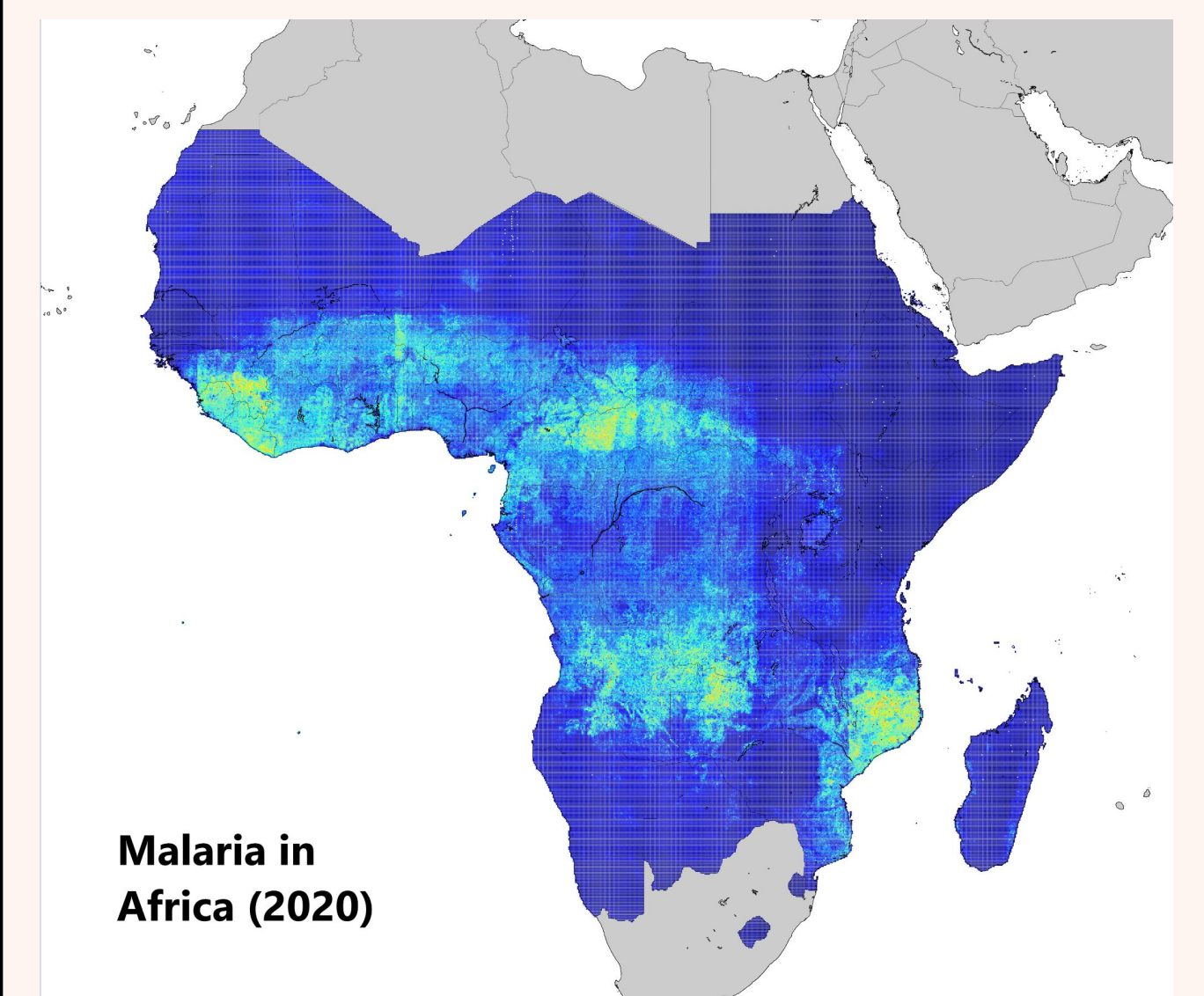
Predictions

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Malaria Prediction 2020



Conclusion

Using Contrastive learning can accurately predict the prevalence of malaria infections based on geographical features using remote sensing. Based on the trend of malaria predictions in a temporal space, policy interventions can be introduced to further decrease the spread of malaria.