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Accurate spatial prediction with limited data

Abstract

To improve the prediction accuracy of spatial data using machine learning, a sufficient amount of data are typically required. In this research, we propose a new meta-learning method that learns how to learn from diverse sensor data collected across multiple regions. Our method enables improved prediction even when only a small amount of data are available for new regions and sensors. For effective meta-learning, we introduce a neural Gaussian process model, which combines deep learning – capable of handling complex data – with Gaussian processes, which allow efficient learning from limited data. Our approach can be applied to tasks such as estimating air pollution conditions from a small number of observation points or predicting traffic volume from short-term data. We will further advance meta-learning techniques to build accurate and reliable Al systems, even in data-scarce environments, thereby expanding the range of applications where Al can be effectively utilized.



References

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