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Creating High-Resolution Meteorological Forecasts Using Artificial Neural Networks

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We are interested in the statistical downscaling of the low resolution Global Climate Model (GCM) forecast data so that it can be injected into high-resolution models. We use a neural network optimization technique to estimate high-resolution features given low-resolution constraints from the GCM.

Our study region is the North East domain $[{35N, 45N} \times {-85W, -65W}]$, with a particular focus on temperature extremes. We apply a simple bilinear interpolation to the low-resolution data. These can be further improved by ingesting the digital elevation information. We use the neural network in the multivariate regression mode with ground-truth Daymet data.

Since the Daymet is only available in current scenario, our scheme will be more useful for providing the high-resolution atmospheric variables for the future scenario. These high-resolution extremes can be used to study effects of climate change into the terrestrial ecosystems in the long term.