MICROPHYSICS

Aim

Emulate the warm rain processes within the Tel Aviv University (TAU) spectral bin microphysics scheme for use within the Community Atmosphere Model

Team 59

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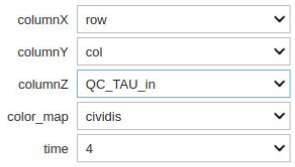
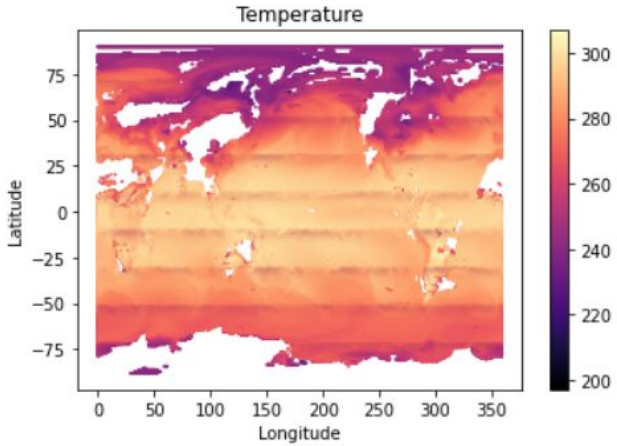
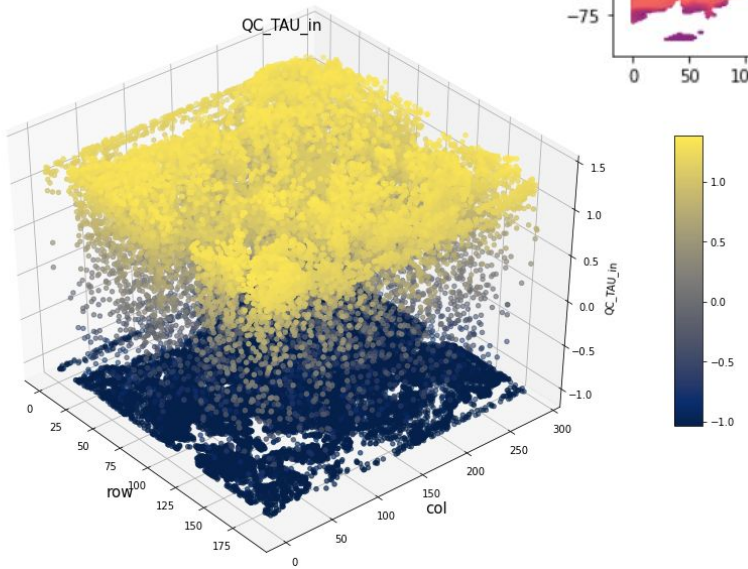
Exploratory visualizations

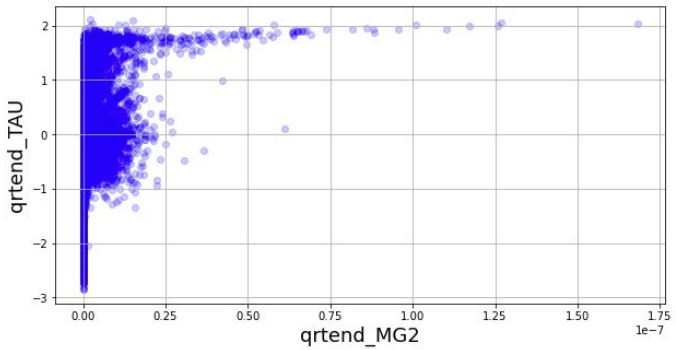
For the preliminary analysis were made:

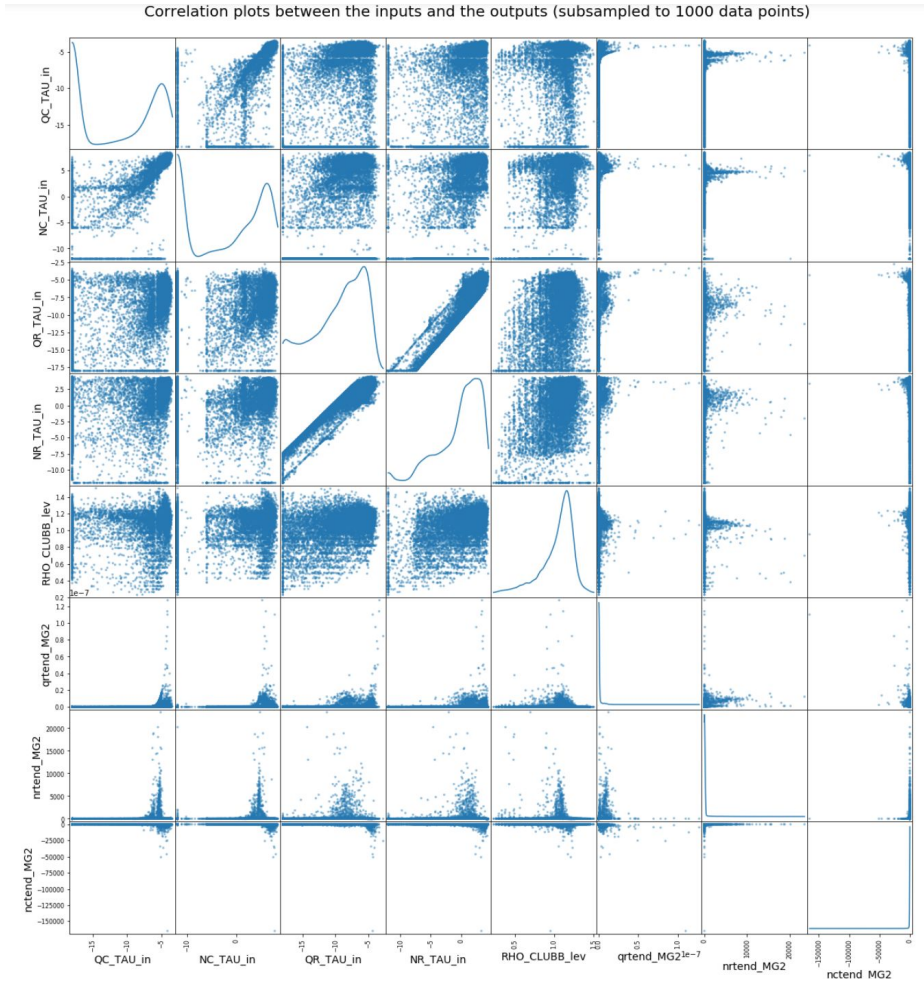
- Joined datasets have been prepared for training and testing;
- Interactive visualizations using the ipywidgets module;
- Correlation plots;
- Maps.











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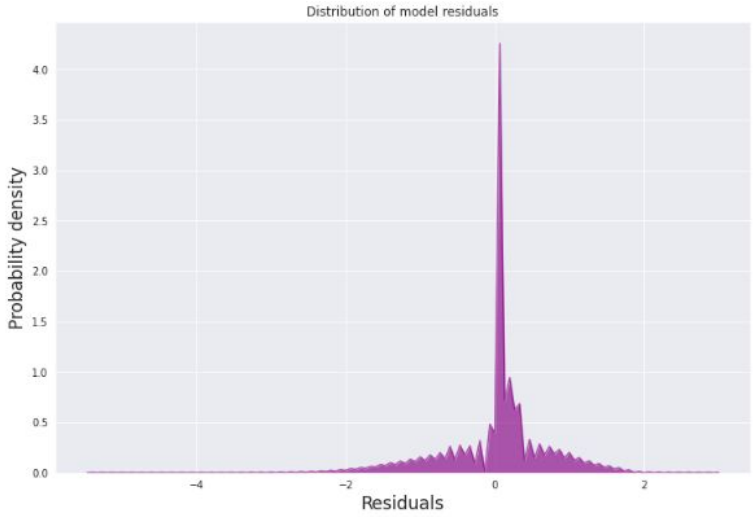
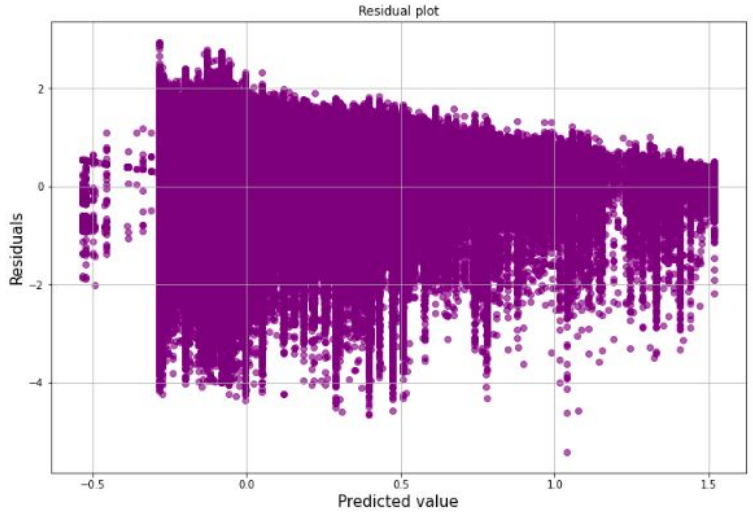
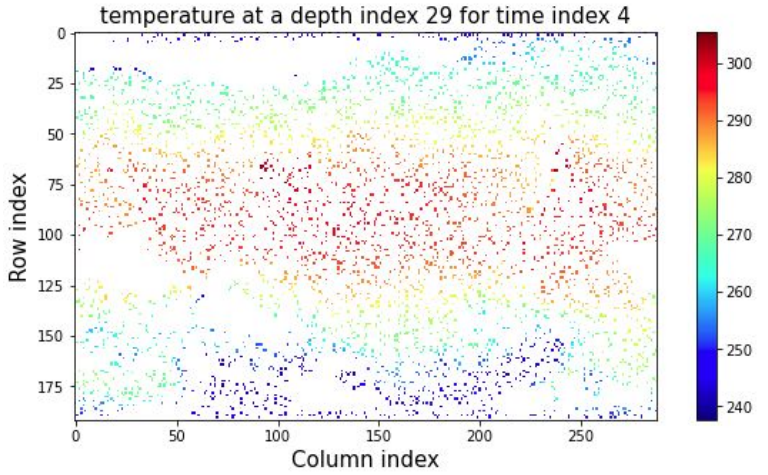
Implemented models

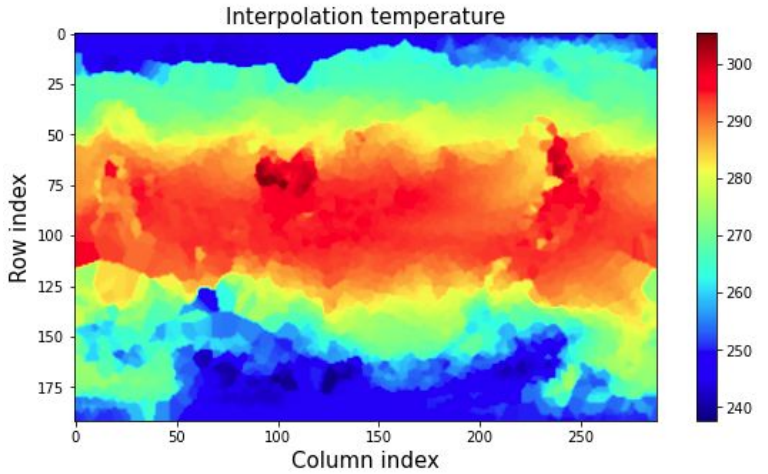
Baseline models for predict qrtend_TAU, nrtend_TAU and nctend_TAU:

- Linear regression;
- Decision tree;
- Random forest regression.









Different architectures of artificial neural networks:

- Densely connected neural network;
- Convolutional Neural Network.

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Conclusion

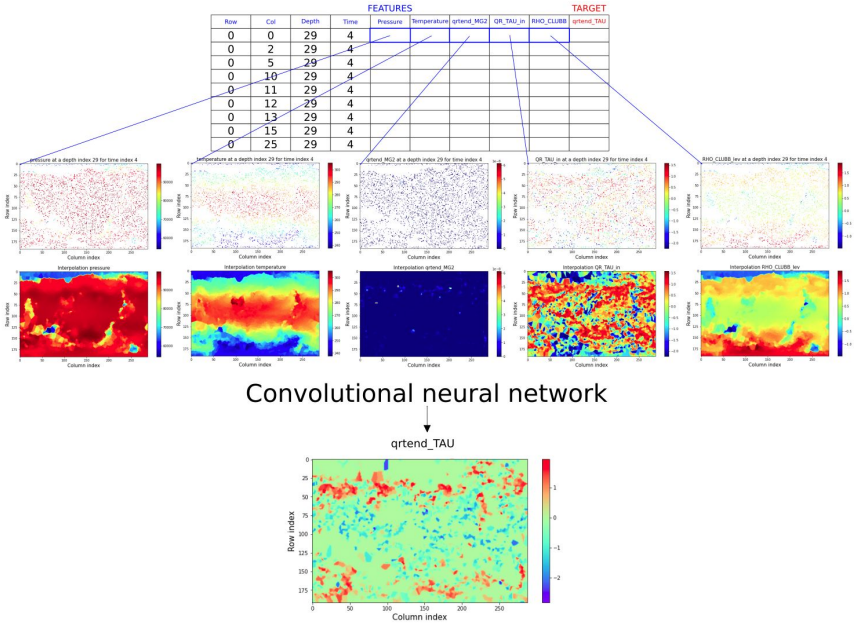
Metrics of models for test sample:

Linear Regression	qrtend_TAU	nrtend_TAU	nctend_TAU
MAE	0.43	0.51	0.50
RMSE	0.61	0.72	0.68

Decision Tree	qrtend_TAU	nrtend_TAU	nctend_TAU
MAE	0.06	0.09	0.04
RMSE	0.24	0.27	0.17

Random Forest	qrtend_TAU	nrtend_TAU	nctend_TAU
MAE	0.06	0.08	0.04
RMSE	0.18	0.20	0.13

Dense Neural Network	qrtend_TAU	nrtend_TAU	nctend_TAU
MAE	0.36	0.43	0.22
RMSE	0.66	0.7	0.66



Main conclusions:

- A CNN based model can emulate the behavior of a model on incomplete data, but the accuracy of the model is not very high at the moment (MAE for qrtend_TAU - 0.36, RMSE - 0.66);
- The most accurate model was Random Forest with mean absolute error 0.06 in the test sample.

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Thanks for your attention!
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