

Estimating heat profiles of industrial processes

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Objective

Provide Composite Curves (CCs) and Grand Composite Curves (GCCs) for processes lacking such data. These are useful in estimating the potential use of renewable energy sources for heating and cooling requirements.

Problem

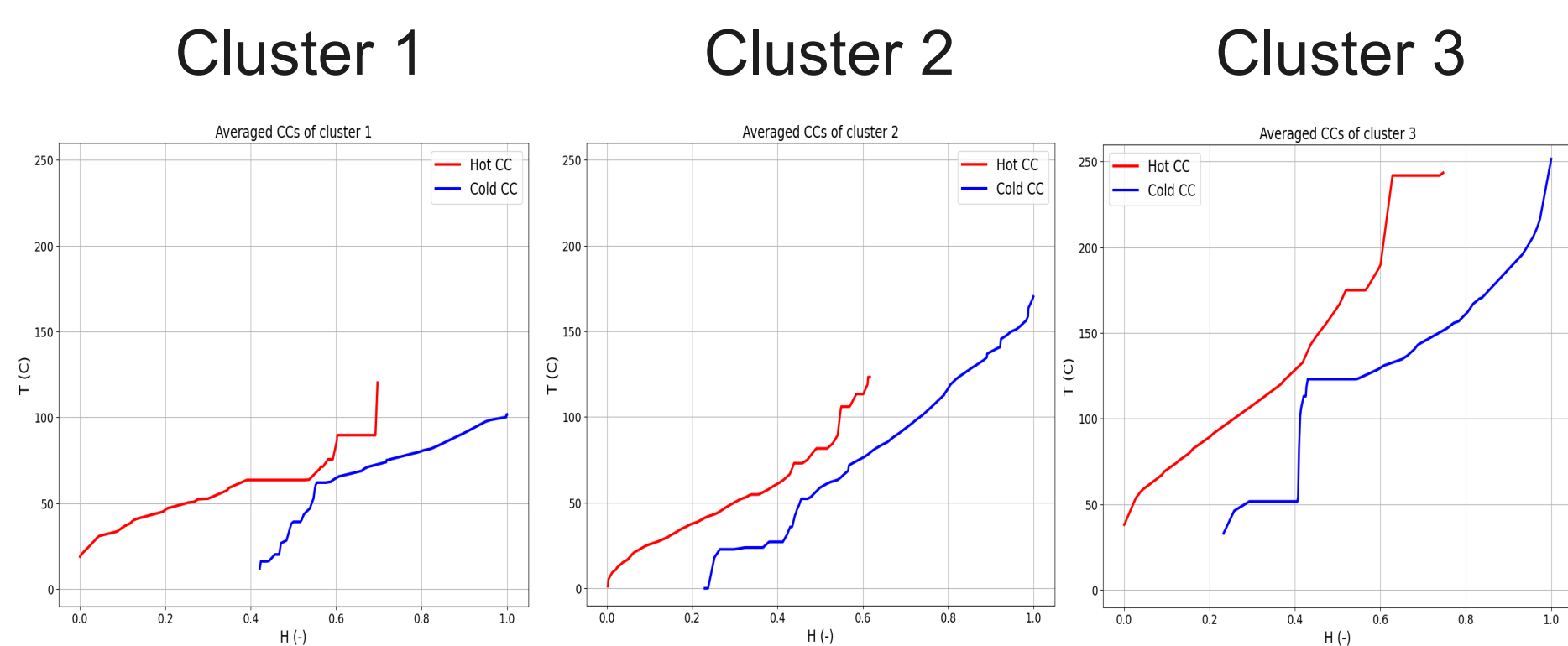
The availability of CCs for the industrial processes operated in Switzerland is very limited. It is possible to estimate missing CCs for low-to-medium temperature ranges by analysing the available ones using black-box algorithms.

Introduction

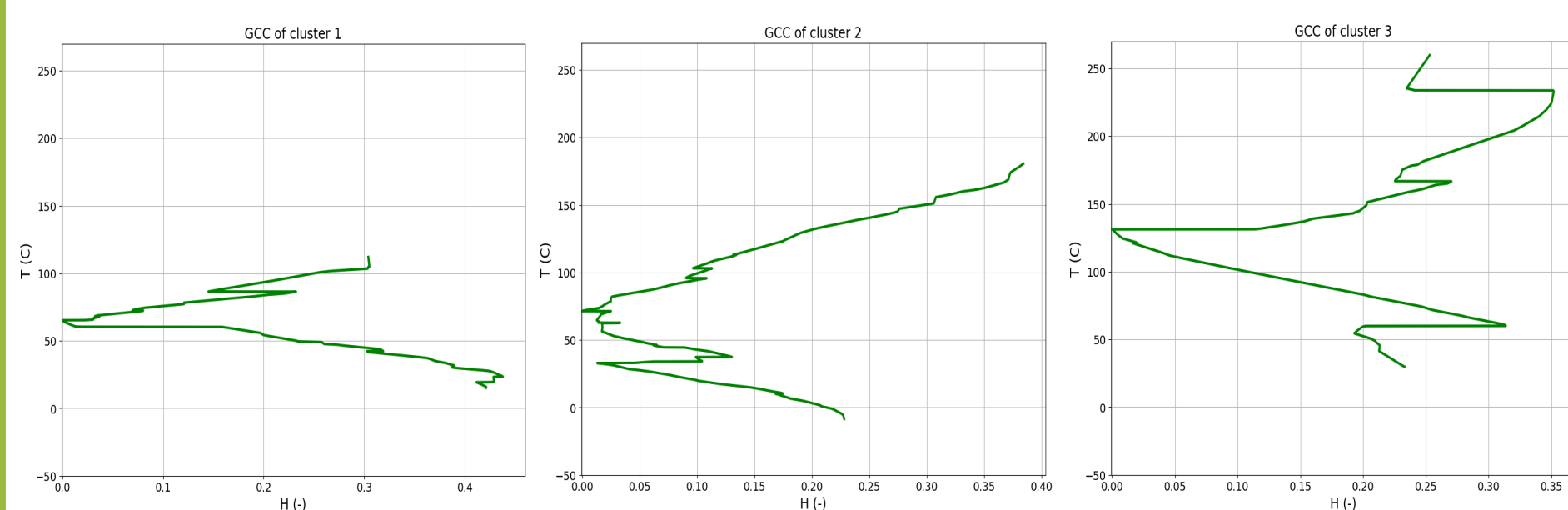
Contrary to fossil fuels, the temperature level that is achievable by many renewable energy sources (geothermal, solar thermal, ambient heat with or without heat pumps, etc.) is limited. Understanding the temperature levels involved in the heating and cooling of industrial processes is a prerequisite for the development of decarbonization strategies.

Results

• Representative CCs

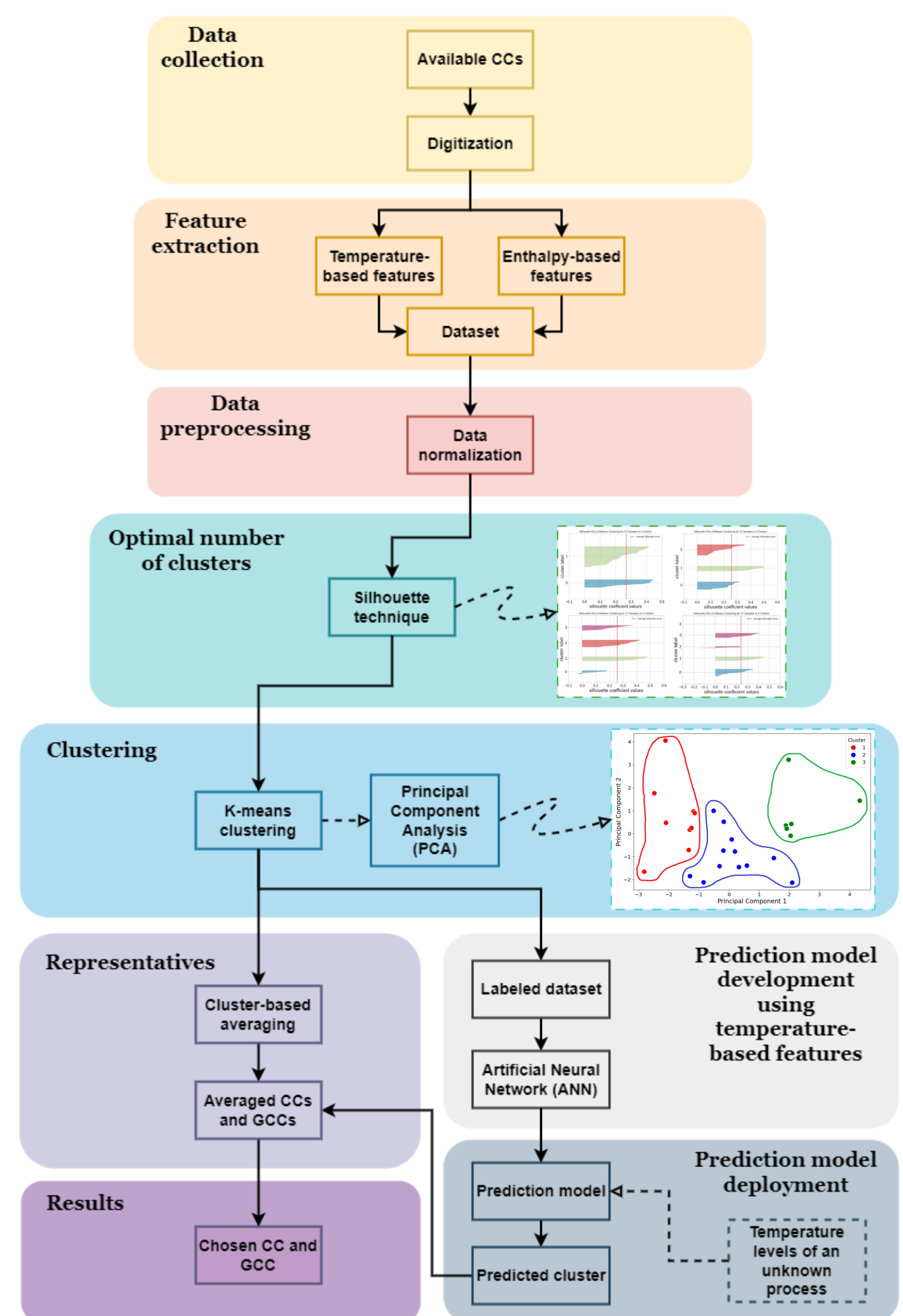


• Representative GCCs



• The accuracy of ANN = 89%

Methodology



Conclusions

- 27 CCs were grouped in three clusters
- A predictive ANN model with 89% accuracy was developed
- This enables the selection of an estimated CC/GCC for a given process lacking such data
- The addition of more CCs to the dataset can enhance accuracy.

Contributors