



**Silesian University
of Technology**

FACULTY OF AUTOMATIC CONTROL, ELECTRONICS AND
COMPUTER SCIENCE

DOCTORAL DISSERTATION

**Multi-image super-resolution
reconstruction using deep graph
neural networks**

*A thesis submitted in fulfillment of the requirements
for the degree of Doctor of Philosophy*

mgr inż. Tomasz Tarasiewicz

Supervisor: dr hab. inż. Michał Kawulok, prof. PŚ

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Abstract

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This dissertation introduces the application of graph neural networks (GNNs) for a multi-image super-resolution (MISR) problem. An in-depth review of existing techniques identifies valuable contributions, but also points towards unexplored avenues. Responding to this gap, this thesis presents a model that capitalizes on the unique strengths of GNNs. Their inherent ability to manipulate graph data structures offers both flexibility and an intricate understanding of relational data, positioning GNNs as a promising alternative for addressing MISR challenges.

To ensure the effectiveness and robustness of the proposed techniques, the model was tested across a selection of datasets. These assessments not only substantiate the model's effectiveness but also highlight its distinct approach. Beyond aligning with current benchmarks, this work suggests the potential shift in the MISR domain towards graph-centric methodologies. An in-depth exploration of the model's mechanisms further reveals its nuances, enhancing comprehension of its role within the MISR context. Additionally, the study points towards promising avenues for future research, emphasizing the lasting relevance of this investigation.

In summary, this dissertation highlights the versatility of GNNs in MISR, pointing to a broader spectrum of opportunities in computer vision and establishing a groundwork for subsequent breakthroughs in the field.