

Posudek diplomové práce

Matematicko-fyzikální fakulta Univerzity Karlovy

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Název práce	Intelligent Interior Design – Style Compatibility of 3D Furniture Models using Neural Networks		
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Text posudku:

The thesis explores methods of unsupervised learning of a neural network-based feature extractor for extraction of style-defining features from 3D models of mainly furniture and buildings. The author replicates existing work (due to lack of published code) and modifies an existing *triplet network* architecture to work with a different, more compact, input format: point cloud rather than rendered images. To my knowledge, this has not been done before.

The *triplet network* is trained on an auxiliary classification task: selection of which of two given objects has more “style-compatible” to a given reference object. Although the modified architecture didn’t achieve accuracy on this task sufficient for practical applications, the exploration, experiment results and suggested future work may be beneficial to further research of the style-similarity topic.

The author did a large amount of work, both in replication of the previous work and in design and execution of his own experiments.

In the practical part of this work, he was capable of fast implementation of experiment code using suitable tools and services and not hesitant to ask for clarification of ambiguous method description in the replicated paper.

The explanations of results and description of possible causes of observed bad training performance are generally sound, but sometimes the proposed hypotheses could be confirmed or disproved with an additional experiment. Given the amount of work already put into replication of previous work and own experiments, I don't consider this a major flaw.

The experiment with feature extraction from a point cloud covering sub-parts of an object is relatively basic, only using four large-scale sub-parts of the input object. Intuitively, using a higher number of smaller sub-parts (or preferably sub-parts of different scale) would better capture style-defining details on the object surface, such as roundness of edges.

In the chapter “Experiments and Results”, the section “Results of the Point Cloud Based Model” could be split to shorter subsections for easier reading of individual experiments’ results.

Also, it would be welcome if there was a more in-depth evaluation of the trained models, using the replicated work or a modified model in a real-world scenario, such as retrieval of top-n style-compatible objects from the dataset for a given 3D object.

Overall the work is well-written and presents results of a novel modification to a style-

based feature extraction approach. In addition, it provides an implementation of related work, whose source code has not been published by the authors of the original papers.

Práci doporučuji k obhajobě.

Práci nenavrhuji na zvláštní ocenění.

Pokud práci navrhuje na zvláštní ocenění (cena děkana apod.), prosím uveďte zde stručné zdůvodnění (vzniklé publikace, významnost tématu, inovativnost práce apod.).

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Podpis