Author Review Overview paper1021

Overview

[-] [|-|]	ReviewId	6880	7588	7541	7552
	Classification	Research paper (presents innovative research results)	Research paper (presents innovative research results)	Research paper (presents innovative research results)	Research paper (presents innovative research results)

6880: Research paper (presents innovative research results)

7588: Research paper (presents innovative research results)

7541: Research paper (presents innovative research results)

7552: Research paper (presents innovative research results)

[+][|+|] **Summary**

6880: This paper describes a deep learning technique for learning structural variations in collections of shapes. It demonstrates applications in improving segmentations and correspondences. It also shows that the method can be used to synthesize novel objects.

The use of deep learning for this problem is novel and interesting. It also enables modeling variations beyond simple primitive-based templates, which is probably going to be even more useful on datasets that have more interesting variations than chairs and airplanes.

7588: This paper develops what I believe to be the first deep learning based framework for joint analysis and synthesis of diverse 3D shape collections. The learned probabilistic part representations can be used to estimate point or part correspondences across the set and synthesize new shapes.

7541: This paper describes a probabilistic model that learns part-based template from a set of shapes. Such method is designed to learn part representation, perform correspondences and alignment deformation, compute segmentations, and generates shape variations.
The main contributions, as claimed, are: 1) the learning of both geometry and deformation parameters of templates of a set of shapes, and 2) a generative model learned with the help of Deep Boltzmann Machines (DBM).

7552: The paper presents a joint segmentation and analysis framework for shape collections. The paper uses contrastive learning for parameter learning and thus creates a probabilistic deformation model for the shape collections.

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[+][|+|]	**Originality, Novelty**	7	7	6	6

6880: 7
There are several probabilistic models learned from shape collections, so the idea is not new. The details that enable the use of deep learning are interesting and novel.

7588: 7
The main novelty is in the deep learning framework, though not new from an AI/ML perspective, but to apply it effectively to process diverse shape collections seems new. I also like the fact that the model is not limited to part arrangements.

7541: 6
The first contribution is a generalization of Kim et al. 2013. The major difference is that this paper adopts a probabilistic model encoding a large number of parameters, which covers almost all aspects of structure-aware analysis of a shape set. Such extension is significant, although not quite novel, at least not conceptually. The second contribution, as claimed, is to utilize deep learning in parameter learning of the generative model. This is more a direct application of sophisticated machine learning technique in the problem in hand. See more below.

7552: 6
The paper makes a few interesting additions to recent works of Kim et al. and Huang et al. The proposed method marginally improves existing results -- this is significant in this topic.

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[+][|+|]	**Clarity of presentation**	6	6	6	8

6880: 6
The paper is not an easy read. It's overloaded with stacks of equations and there are not many figures that illustrate ideas at high level. That said, the content is rich, so I cannot suggest a remedy.

7588: 6

7541: 6
The method is very complicated; I believe the authors have tried best to make the exposition clear. However, there are still some very lengthy paragraphs here and there which are hard to get the point.

7552: 8
The paper represents a huge effort that has also been well documented (including supplementary materials).

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[+][|+|]	**Technical soundness**	8	6	5	7

6880: 8
The method seems to capture various aspects of 'shape variations' (mostly inspired by what was considered relevant in previous work). I think this technique relies on learning more often than ad-hoc parameters which is appealing.

7588: 6
Maybe a bit too technical and the paper is 14 pages long. Maybe some technical parts which are not contributions of this paper, i.e., they are know stuff from ML, can be reduced.

7541: 5
Since the proposed method is quite heavy, combining numerous existing heavy technical components, it is not easy to evaluate its technical soundness, robustness and generality.

7552: 7

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[+][|+|]	**Importance, utility**	7	8	7	7

6880: 7
This work might be useful. However, unless implementation is publicly available it will be hard to apply this technique to other datasets.

7588: 8

7541: 7
The problem solved in this paper is important.

7552: 7

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[+][|+|]	**Suitable for event**	7	9	9	8

6880: 7
Clearly acceptable for SGP.

7588: 9

7541: 9

7552: 8

		Clearly acceptable for SGP.			
[+][|+|]	**Implementation**	5	4	5	6

6880: 5
I think the method would not be easy to implement.

7588: 4
I am not sure; the technical description is pretty dense. I would not have the courage to re-implement it. It will be great if the authors will provide code.

7541: 5
The implementation could be hard.

7552: 6
This work is going to be quite challenging to reproduce given the huge amount of effort that went in producing this work.

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[+][[+]]	**Completeness of References**	7	6	4	7

6880: 7
All references are included.

7588: 6
I think the following work should be cited and discussed: