



# Abstract: Unsupervised Anomaly Localization Using Variational Auto-Encoders

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An assumption-free automatic check of medical images for potentially overseen anomalies would be a valuable assistance for a radiologist. Deep learning and especially Variational Auto-Encoders (VAEs) have shown great potential in the unsupervised learning of data distributions. In principle, this allows for such a check and even the localization of parts in the image that are most suspicious. Currently, however, the reconstruction-based localization by design requires adjusting the model architecture to the specific problem looked at during evaluation. This contradicts the principle of building assumption-free models. We propose complementing the localization part with a term derived from the Kullback-Leibler (KL)-divergence. For validation, we perform a series of experiments on FashionMNIST as well as on a medical task including >1000 healthy and >250 brain tumor patients. Results show that the proposed formalism outperforms the state of the art VAE-based localization of anomalies across many hyperparameter settings and also shows a competitive max performance. This work was previously presented at MICCAI 2019 [1].

## References

1. Zimmerer D, Isensee F, Petersen J, et al.; Springer. Unsupervised anomaly localization using variational auto-encoders. Proc MICCAI. 2019;.