Back to the Feature: Classical 3D Features are (Almost) All You Need for 3D Anomaly Detection

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Do current 3D methods beat 2D methods?

Currently, state-of-the-art methods for image anomaly detection that use only color information, outperform 3D anomaly detection methods that use 3D or 3D + color information

Modality Method	Voxel GAN	Voxel+RGB GAN	PC 3D-ST	RGB PatchCore
PRO	0.583	0.639	0.833	0.876
I-ROC	0.537	0.517	-	0.785

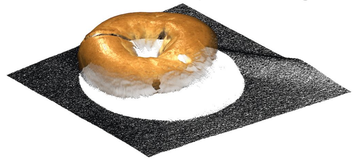
Input GT PatchCore RGB

Is 3D information potentially useful?

3D information is often required to identify anomalies, even when color is available

2D View 3D View

3D Aware Preprocessing



What are the key properties of successful 3D anomaly detection representations?

Handcrafted, rotation-invariant 3D representations are extremely effective for anomaly detection and segmentation when 3D information is available

Modality Method	Depth Raw	Depth HoG	Depth SIFT	PC FPFH
PRO	0.191	0.614	0.866	0.924
I-ROC	0.528	0.560	0.714	0.753
P-ROC	0.548	0.845	0.954	0.980

Raw HoG SIFT

Are there complimentary benefits from using both 3D and color modalities?

Our method (BTF) combines color and 3D, achieving SoTA results on MVTec 3D-AD

Modality Method	PC FPFH	PC + RGB BTF (Ours)
PRO	0.924	0.964
I-ROC	0.753	0.865
P-ROC	0.980	0.993

FPFH BTF (Ours) FPFH BTF (Ours)