# Shape

A shape is the form of an object or its external boundary, outline, or external surface, as opposed to other properties such as color, texture, or material composition.

see Aneurysm shape.

see Tumor shape.

---

The shape is commonly used to describe the objects. State-of-the-art algorithms in medical imaging are predominantly diverging from computer vision, where voxel grids, meshes, point clouds, and implicit surface models are used. This is seen from the growing popularity of ShapeNet (51,300 models) and Princeton ModelNet (127,915 models). However, a large collection of anatomical shapes (e.g., bones, organs, vessels) and 3D models of surgical instruments is missing.

Li et al. present MedShapeNet to translate data-driven vision algorithms to medical applications and to adapt state-of-the-art vision algorithms to medical problems. As a unique feature, we directly model the majority of shapes on the imaging data of real patients. We present use cases in classifying brain tumors, skull reconstructions, multi-class anatomy completion, education, and 3D printing.

Results: By now, MedShapeNet includes 23 datasets with more than 100,000 shapes that are paired with annotations (ground truth). Our data is freely accessible via a web interface and a Python application programming interface and can be used for discriminative, reconstructive, and variational benchmarks as well as various applications in virtual, augmented, or mixed reality, and 3D printing.

MedShapeNet contains medical shapes from anatomy and surgical instruments and will continue to collect data for benchmarks and applications. The project page is: https://medshapenet.ikim.nrw/ [1)].

1)
Li J, Zhou Z, Yang J, Pepe A, Gsaxner C, Luijten G, Qu C, Zhang T, Chen X, Li W, Wodzinski M, Friedrich P, Xie K, Jin Y, Ambigapathy N, Nasca E, Solak N, Melito GM, Vu VD, Memon AR, Schlachta C, De Ribaupierre S, Patel R, Eagleson R, Chen X, Mächler H, Kirschke JS, de la Rosa E, Christ PF, Li HB, Ellis DG, Aizenberg MR, Gatidis S, Küstner T, Shusharina N, Heller N, Andrearczyk V, Depeursinge A, Hatt M, Sekuboyina A, Löffler MT, Liebl H, Dorent R, Vercauteren T, Shapey J, Kujawa A, Cornelissen S, Langenhuizen P, Ben-Hamadou A, Rekik A, Pujades S, Boyer E, Bolelli F, Grana C, Lumetti L, Salehi H, Ma J, Zhang Y, Gharleghi R, Beier S, Sowmya A, Garza-Villarreal EA, Balducci T, Angeles-Valdez D, Souza R, Rittner L, Frayne R, Ji Y, Ferrari V, Chatterjee S, Dubost F, Schreiber S, Mattern H, Speck O, Haehn D, John C, Nürnberger A, Pedrosa J, Ferreira C, Aresta G, Cunha A, Campilho A, Suter Y, Garcia J, Lalande A, Vandenbossche V, Van Oevelen A, Duquesne K, Mekhzoum H, Vandemeulebroucke J, Audenaert E, Krebs C, van Leeuwen T, Vereecke E, Heidemeyer H, Röhrig R, Hölzle F, Badeli V, Krieger K, Gunzer M, Chen J, van Meegdenburg T, Dada A, Balzer M, Fragemann J, Jonske F, Rempe M, Malorodov S, Bahnsen FH, Seibold C, Jaus A, Marinov Z, Jaeger PF, Stiefelhagen R, Santos AS, Lindo M, Ferreira A, Alves V, Kamp M, Abourayya A, Nensa F, Hörst F, Brehmer A, Heine L, Hanusrichter Y, Weßling M, Dudda M, Podleska LE, Fink MA, Keyl J, Tserpes K, Kim MS, Elhabian S, Lamecker H, Zukić D, Paniagua B, Wachinger C, Urschler M, Duong L, Wasserthal J, Hoyer PF, Basu O, Maal T, Witjes MJH, Schiele G, Chang TC, Ahmadi SA, Luo P, Menze B, Reyes M, Deserno TM, Davatzikos C, Puladi B, Fua P, Yuille AL, Kleesiek J, Egger J. MedShapeNet - a large-scale dataset of 3D medical shapes for computer vision. Biomed Tech (Berl). 2024 Dec 30. doi: 10.1515/bmt-2024-0396. Epub ahead of print. PMID:

39733351.