Deep learning-based autocontouring

in radiation therapy for various clinical environments

SIEMENS Healthineers

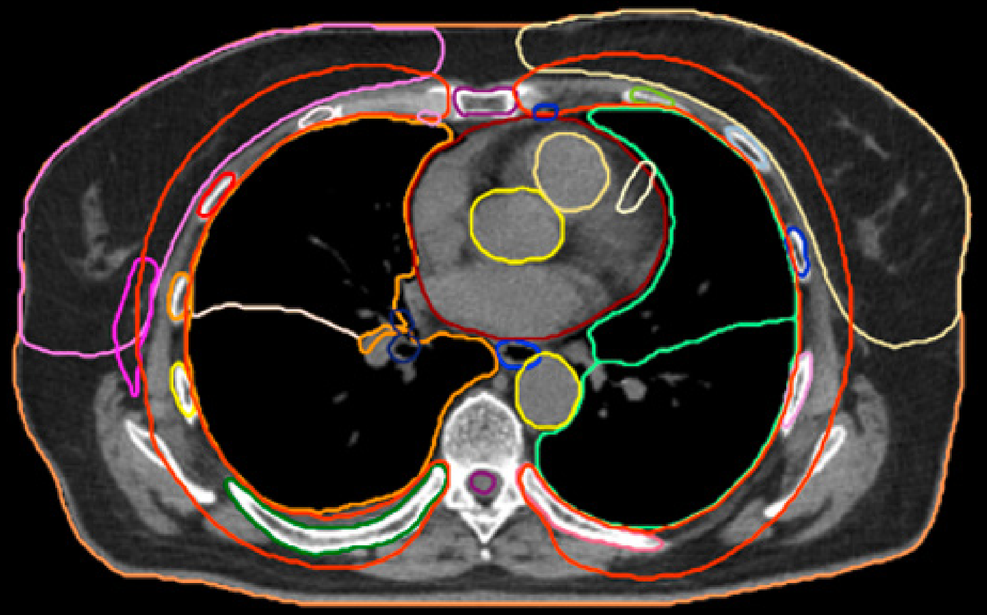
What can AI in autocontouring do for me and what are the features of the autocontouring solutions from Siemens Healthineers?

This product provides radiation oncology professionals with automatic contouring of predefined structures, including organs at risk (OARs), gross tumor volume (GTV), and lymph nodes, which serves as the basis for their radiation therapy planning.

The images acquired at the CT and MRI scanner are sent to autocontouring software to be processed. The resulting DICOM Radiotherapy Structure Sets can then be pushed directly to the treatment planning system (TPS).

The software contours over 200 structures within the human body. It is used in conjunction with other software, such as treatment planning systems and interactive contouring applications, to review, edit, and accept contours. The autocontouring software is offered in different deployment types[1]:

1. The server-based solution, *syngo*.via RT Image Suite[2]
2. The cloud or edge-based solution, AI-Rad Companion Organs RT[3]
3. The software can be run directly on your planning CT with DirectORGANS[4]



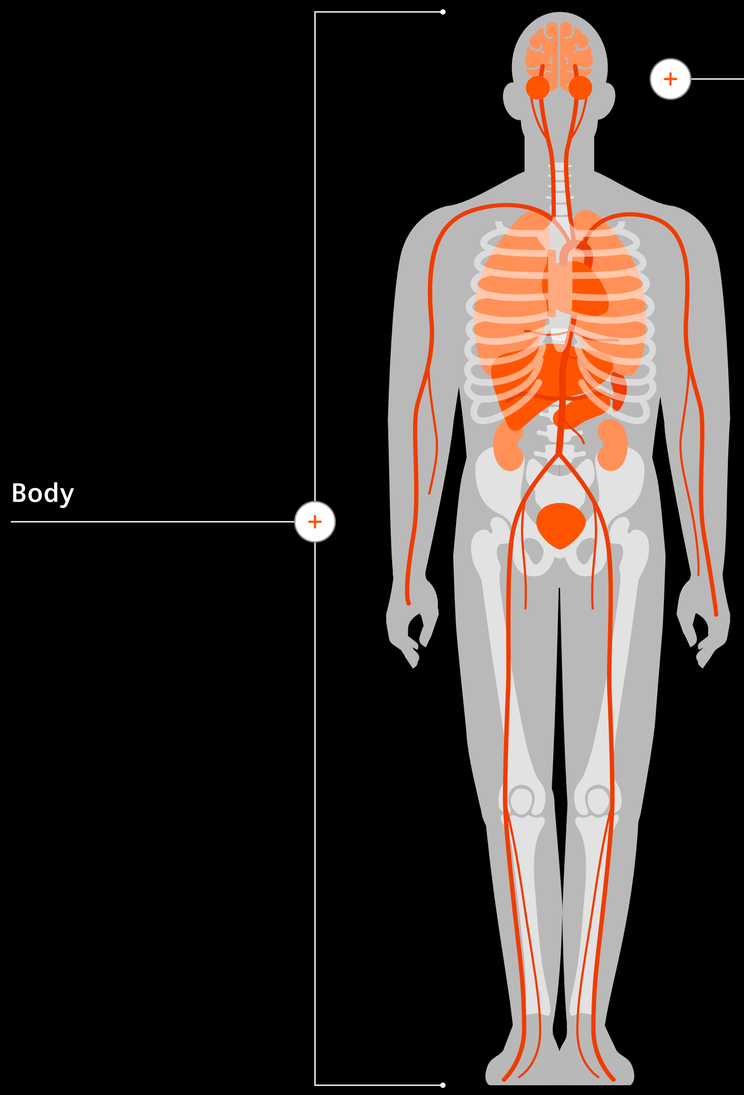
Courtesy of Nordstrahl MVZ GmbH, Nuremberg, Germany

Automate your workflow for enhanced AI-driven outcomes: Save time contouring and use the correct guidelines as a standard

A series of scientific studies were conducted and the overall results showed acceptable outcomes in the automatic contouring of OARs using algorithms and an enhanced workflow from Siemens Healthineers.[5]

Following the correct predefined guidelines can be key to a streamlined workflow, allowing you to leverage potential efficiency gains. We added multi-guideline support so that you can choose the guideline you prefer for selected structures.

The following overview shows which structures are available for each product with the latest software versions.



› Please click the + sign on the body region to access the complete list of organs.

Head/Neck

CT	*syngo*.via RT Image Suite VB80	*syngo*.via RT Image Suite VC10	DirectORGANS VB10	DirectORGANS VB20	AI-Rad Companion Organs RT VA60	AI-Rad Companion Organs RT VA70
Brain	●	●	●	●	●	●
Brainstem	●	●	●	●	●	●
Eye Globe Left	●	●	●	●	●	●
Eye Globe Right	●	●	●	●	●	●
Lacrimal Gland Left	–	●	–	●	●	●
Lacrimal Gland Right	–	●	–	●	●	●
Pituitary Gland	–	●	–	●	●	●
Larynx	●	●	●	●	●	●
Lips	●	●	●	●	●	●
Mandible	●	●	●	●	●	●
Parotid Gland Left	●	●	●	●	●	●
Parotid Gland Right	●	●	●	●	●	●
Submandibular Gland Left	●	●	●	●	●	●
Submandibular Gland Right	●	●	●	●	●	●
Lens Left	●	●	●	●	●	●
Lens Right	●	●	●	●	●	●

Head/Neck

CT	*syngo*.via RT Image Suite VB80	*syngo*.via RT Image Suite VC10	DirectORGANS VB10	DirectORGANS VB20	AI-Rad Companion Organs RT VA60	AI-Rad Companion Organs RT VA70
Oral Cavity	●	●	●	●	●	●
Glottis	●	●	●	●	●	●
Optic Chiasm	●	●	●	●	●	●
Optic Nerve Left	●	●	●	●	●	●
Optic Nerve Right	●	●	●	●	●	●
Supraglottic Larynx	●	●	●	●	●	●
LN Level Ia Submental Triangle	●	●	●	●	●	●
LN Level Ib Submandibular Triangle Left	●	●	●	●	●	●
LN Level Ib Submandibular Triangle Right	●	●	●	●	●	●
LN Level II Upper Jugular Nodes Left	●	●	●	●	●	●
LN Level II Upper Jugular Nodes Right	●	●	●	●	●	●
LN Level III Middle Jugular Nodes Left	●	●	●	●	●	●
LN Level III Middle Jugular Nodes Right	●	●	●	●	●	●
LN Level IVa Lower Jugular Group Left	●	●	●	●	●	●
LN Level IVa Lower Jugular Group Right	●	●	●	●	●	●
LN Level IVb Medial Supraclavicular Group Left	●	●	●	●	●	●

Head/Neck

CT	*syngo*.via RT Image Suite VB80	*syngo*.via RT Image Suite VC10	DirectORGANS VB10	DirectORGANS VB20	AI-Rad Companion Organs RT VA60	AI-Rad Companion Organs RT VA70
LN Level IVb Medial Supraclavicular Group Right	●	●	●	●	●	●
LN Level IX Bucco-facial Group Left	●	●	●	●	●	●
LN Level IX Bucco-facial Group Right	●	●	●	●	●	●
LN Level V Posterior Triangle Group Left	●	●	●	●	●	●
LN Level V Posterior Triangle Group Right	●	●	●	●	●	●
LN Level Vc Lateral Supraclavicular Group Left	●	●	●	●	●	●
LN Level Vc Lateral Supraclavicular Group Right	●	●	●	●	●	●
LN Level VIa Anterior Jugular Nodes	●	●	●	●	●	●
LN Level VIb Prelaryngeal, Pretracheal, & Paratracheal Nodes	●	●	●	●	●	●
LN Level VIIa Retropharyngeal Nodes Left	●	●	●	●	●	●
LN Level VIIa Retropharyngeal Nodes Right	●	●	●	●	●	●
LN Level VIIb Retro-styloid Nodes Left	●	●	●	●	●	●
LN Level VIIb Retro-styloid Nodes Right	●	●	●	●	●	●
LN Level VIII Parotid Group Left	●	●	●	●	●	●
LN Level VIII Parotid Group Right	●	●	●	●	●	●

Head/Neck

CT	*syngo*.via RT Image Suite VB80	*syngo*.via RT Image Suite VC10	DirectORGANS VB10	DirectORGANS VB20	AI-Rad Companion Organs RT VA60	AI-Rad Companion Organs RT VA70
LN Level Xa Retroauricular & Subauricular Nodes Left	●	●	●	●	●	●
LN Level Xa Retroauricular & Subauricular Nodes Right	●	●	●	●	●	●
LN Level Xb Occipital Nodes Left	●	●	●	●	●	●
LN Level Xb Occipital Nodes Right	●	●	●	●	●	●
Cochlea Left	●	●	●	●	●	●
Cochlea Right	●	●	●	●	●	●
Pharyngeal Constrictor Muscle Inferior	●	●	●	●	●	●
Pharyngeal Constrictor Muscle Middle	●	●	●	●	●	●
Pharyngeal Constrictor Muscle Superior	●	●	●	●	●	●
Thyroid	●	●	●	●	●	●

Head/Neck

MR	*syngo*.via RT Image Suite VB80	*syngo*.via RT Image Suite VC10	DirectORGANS VB10	DirectORGANS VB20	AI-Rad Companion Organs RT VA60	AI-Rad Companion Organs RT VA70
Brainstem	–	●	–	–	–	●
Cochlea Left	–	●	–	–	–	●
Cochlea Right	–	●	–	–	–	●
Cornea Left	–	●	–	–	–	●
Cornea Right	–	●	–	–	–	●
Eye Globe Left	–	●	–	–	–	●
Eye Globe Right	–	●	–	–	–	●
Hippocampus Left	–	●	–	–	–	●
Hippocampus Right	–	●	–	–	–	●
Lacrimal Gland Left	–	●	–	–	–	●
Lacrimal Gland Right	–	●	–	–	–	●
Lens Left	–	●	–	–	–	●
Lens Right	–	●	–	–	–	●
Optic Nerve Left	–	●	–	–	–	●
Optic Nerve Right	–	●	–	–	–	●
Optic Chiasm	–	●	–	–	–	●

Head/Neck

MR	*syngo*.via RT Image Suite VB80	*syngo*.via RT Image Suite VC10	DirectORGANS VB10	DirectORGANS VB20	AI-Rad Companion Organs RT VA60	AI-Rad Companion Organs RT VA70
Pituitary Gland	–	●	–	–	–	●
Retina Left	–	●	–	–	–	●
Retina Right	–	●	–	–	–	●
Spinal cord	–	●	–	–	–	●
Brain metastases[6] (GTV)	–	●	–	–	–	●

Thorax

CT	*syngo*.via RT Image Suite VB80	*syngo*.via RT Image Suite VC10	DirectORGANS VB10	DirectORGANS VB20	AI-Rad Companion Organs RT VA60	AI-Rad Companion Organs RT VA70
Lung Left	●	●	●	●	●	●
Lung Right	●	●	●	●	●	●
Aorta	●	●	●	●	●	●
Esophagus	●	●	●	●	●	●
Female Breast Left	●	●	●	●	●	●
Female Breast Right	●	●	●	●	●	●
Lung Lobe Left Lower	●	●	●	●	●	●
Lung Lobe Left Upper	●	●	●	●	●	●
Lung Lobe Right Lower	●	●	●	●	●	●
Lung Lobe Right Middle	●	●	●	●	●	●
Lung Lobe Right Upper	●	●	●	●	●	●
Ribs	●	●	●	●	●	●
Sternum	●	●	●	●	●	●
Brachial Plexus Left	●	●	●	●	●	●
Brachial Plexus Right	●	●	●	●	●	●
Rib Left 1	●	●	●	●	●	●

Thorax

CT	*syngo*.via RT Image Suite VB80	*syngo*.via RT Image Suite VC10	DirectORGANS VB10	DirectORGANS VB20	AI-Rad Companion Organs RT VA60	AI-Rad Companion Organs RT VA70
Rib Left 2	●	●	●	●	●	●
Rib Left 3	●	●	●	●	●	●
Rib Left 4	●	●	●	●	●	●
Rib Left 5	●	●	●	●	●	●
Rib Left 6	●	●	●	●	●	●
Rib Left 7	●	●	●	●	●	●
Rib Left 8	●	●	●	●	●	●
Rib Left 9	●	●	●	●	●	●
Rib Left 10	●	●	●	●	●	●
Rib Left 11	●	●	●	●	●	●
Rib Left 12	●	●	●	●	●	●
Rib Right 1	●	●	●	●	●	●
Rib Right 2	●	●	●	●	●	●
Rib Right 3	●	●	●	●	●	●
Rib Right 4	●	●	●	●	●	●
Rib Right 5	●	●	●	●	●	●

Thorax

CT	*syngo*.via RT Image Suite VB80	*syngo*.via RT Image Suite VC10	DirectORGANS VB10	DirectORGANS VB20	AI-Rad Companion Organs RT VA60	AI-Rad Companion Organs RT VA70
Rib Right 6	●	●	●	●	●	●
Rib Right 7	●	●	●	●	●	●
Rib Right 8	●	●	●	●	●	●
Rib Right 9	●	●	●	●	●	●
Rib Right 10	●	●	●	●	●	●
Rib Right 11	●	●	●	●	●	●
Rib Right 12	●	●	●	●	●	●
Humeral Head Left	–	●	–	●	●	●
Humeral Head Right	–	●	–	●	●	●
Chest Wall Left	●	●	●	●	●	●
Chest Wall Right	●	●	●	●	●	●
LN Axilla Level I Left	●	●	●	●	●	●
LN Axilla Level I Right	●	●	●	●	●	●
LN Axilla Level II Left	●	●	●	●	●	●
LN Axilla Level II Right	●	●	●	●	●	●
LN Axilla Level III Left	●	●	●	●	●	●

Thorax

CT	*syngo*.via RT Image Suite VB80	*syngo*.via RT Image Suite VC10	DirectORGANS VB10	DirectORGANS VB20	AI-Rad Companion Organs RT VA60	AI-Rad Companion Organs RT VA70
LN Axilla Level III Right	●	●	●	●	●	●
LN Internal Mammary Left	●	●	●	●	●	●
LN Internal Mammary Right	●	●	●	●	●	●
LN Supraclavicular Left	●	●	●	●	●	●
LN Supraclavicular Right	●	●	●	●	●	●
Mediastinal LN 1 Left	–	●	–	●	●	●
Mediastinal LN 1 Right	–	●	–	●	●	●
Mediastinal LN 2 Left	–	●	–	●	●	●
Mediastinal LN 2 Right	–	●	–	●	●	●
Mediastinal LN 3 Anterior	–	●	–	●	●	●
Mediastinal LN 3 Posterior	–	●	–	●	●	●
Mediastinal LN 4 Left	–	●	–	●	●	●
Mediastinal LN 4 Right	–	●	–	●	●	●
Mediastinal LN 5	–	●	–	●	●	●
Mediastinal LN 6	–	●	–	●	●	●
Mediastinal LN 7	–	●	–	●	●	●

Thorax

CT	*syngo*.via RT Image Suite VB80	*syngo*.via RT Image Suite VC10	DirectORGANS VB10	DirectORGANS VB20	AI-Rad Companion Organs RT VA60	AI-Rad Companion Organs RT VA70
Mediastinal LN 8	–	●	–	●	●	●
Mediastinal LN 9 Left	–	●	–	●	●	●
Mediastinal LN 9 Right	–	●	–	●	●	●
Mediastinal LN 10 Left	–	●	–	●	●	●
Mediastinal LN 10 Right	–	●	–	●	●	●
Atrium Right	●	●	●	●	●	●
Ventricle Left	●	●	●	●	●	●
Ventricle Left Endocardium	●	●	●	●	●	●
Ventricle Right	●	●	●	●	●	●
Left Circumflex	–	●	–	●	–	●
Right Coronary Artery	–	●	–	●	–	●

Abdomen

CT	*syngo*.via RT Image Suite VB80	*syngo*.via RT Image Suite VC10	DirectORGANS VB10	DirectORGANS VB20	AI-Rad Companion Organs RT VA60	AI-Rad Companion Organs RT VA70
Kidney Left	●	●	●	●	●	●
Kidney Right	●	●	●	●	●	●
Liver	●	●	●	●	●	●
Abdominopelvic Cavity	●	●	●	●	●	●
Spleen	●	●	●	●	●	●
Bowel Large	●	●	●	●	●	●
Bowel Small	●	●	●	●	●	●
Bowel Bag	–	●	–	●	●	●
Duodenum	●	●	●	●	●	●
Pancreas	●	●	●	●	●	●
Stomach	●	●	●	●	●	●

Pelvis

CT	*syngo*.via RT Image Suite VB80	*syngo*.via RT Image Suite VC10	DirectORGANS VB10	DirectORGANS VB20	AI-Rad Companion Organs RT VA60	AI-Rad Companion Organs RT VA70
Proximal Femur Left	●	●	●	●	●	●
Proximal Femur Right	●	●	●	●	●	●
Hip Bone Left	–	●	–	●	●	●
Hip Bone Right	–	●	–	●	●	●
Femoral Head Left	–	●	–	●	●	●
Femoral Head Right	–	●	–	●	●	●
Sacrum	–	●	–	●	●	●
Bladder	●	●	●	●	●	●
Prostate	●	●	●	●	●	●
Rectum	●	●	●	●	●	●
LN Common Iliac Left	●	●	●	●	●	●
LN Common Iliac Right	●	●	●	●	●	●
LN External Iliac Left	●	●	●	●	●	●
LN External Iliac Right	●	●	●	●	●	●
LN Internal Iliac Left	●	●	●	●	●	●
LN Internal Iliac Right	●	●	●	●	●	●

Pelvis

CT	*syngo*.via RT Image Suite VB80	*syngo*.via RT Image Suite VC10	DirectORGANS VB10	DirectORGANS VB20	AI-Rad Companion Organs RT VA60	AI-Rad Companion Organs RT VA70
LN Obturator Left	●	●	●	●	●	●
LN Obturator Right	●	●	●	●	●	●
LN Presacral	●	●	●	●	●	●
Seminal Vesicles	●	●	●	●	●	●
Penile Bulb	●	●	●	●	●	●
Sigmoid	●	●	●	●	●	●
Uterus	●	●	●	●	●	●

Pelvis

MR	*syngo*.via RT Image Suite VB80	*syngo*.via RT Image Suite VC10	DirectORGANS VB10	DirectORGANS VB20	AI-Rad Companion Organs RT VA60	AI-Rad Companion Organs RT VA70
Anal Canal	–	●	–	–	●	●
Bladder	–	●	–	–	●	●
Body	–	●	–	–	●	●
Femur Left	–	●	–	–	●	●
Femur Right	–	●	–	–	●	●
Penile Bulb	–	●	–	–	●	●
Prostate	–	●	–	–	●	●
Rectum	–	●	–	–	●	●
Seminal Vesicles	–	●	–	–	●	●

Body

CT	*syngo*.via RT Image Suite VB80	*syngo*.via RT Image Suite VC10	DirectORGANS VB10	DirectORGANS VB20	AI-Rad Companion Organs RT VA60	AI-Rad Companion Organs RT VA70
Spinal Cord	●	●	●	●	●	●
Body	●	●	●	●	●	●
Skeleton	●	●	●	●	●	●
Spinal Canal	●	●	●	●	●	●

The results by Siemens Healthineers' customers described herein are based on results that were achieved in the customer's unique setting. Since there is no "typical" hospital and many variables exist (e.g. hospital size, case mix, level of IT adoption) there can be no guarantee that other customers will achieve the same results.

[1] *Features and functionalities of the different products can differ.*

[2] *syngo.via RT Image Suite is not commercially available in all countries. syngo.via VC10 is not for sale in the USA. Its future availability cannot be guaranteed.*

[3] *AI-Rad Companion Organs RT VA60 and VA70 are not commercially available in all countries, and its future availability cannot be ensured. AI-Rad Companion Organs RT VA70 is not for sale in the USA.*

[4] *DirectORGANS is not commercially available in all countries. DirectORGANS VB20 is not for sale in the USA. Its future availability cannot be guaranteed.*

[5] *One example achieved with Siemens Healthineers autocontouring algorithms: https://www.meddos.org/article/S0958-3947(22)00093-0/abstract*

[6] *MR Brain Metastases contouring is a new feature since version VA70. This new feature may not be available in all countries. Its future availability cannot be guaranteed.*

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