Iterata AG Medical Services
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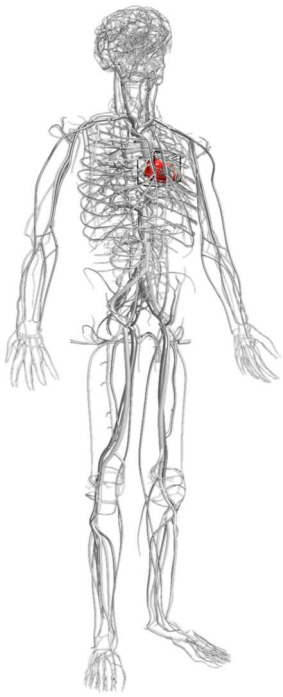
COMPUTATIONAL ANATOMICAL MODELS

Iterata Health Platform developed 3D Anatomy Speed Viewer accessing more than 100'000 anatomical items combined to more than 6’000 3D objects based on Wolfram Mathematica curated data sets.

Novel 3D Speed-Viewer for exploring Anatomy



Introduction
Iterata’s 3D Anatomy Speed HTML-Viewer is based on the infrastructure of the Iterata AG merged with the curated data entities of Wolfram Mathematica Anatomy. As part of two term papers, the 3D Viewer was developed and adapted by two students within 2 weeks. The goal is it to implement the tool into education of students who have to learn these 100’000 items (and 6’000 3D objects) by heart and support them with visual stimulus which enhances the learning effect.
In the first term paper, one student made all the anatomy items available on a 3D-Speed HTML Viewer. In addition, he made the context and content of the items algorithmically addressable via a Search Engine – (Solr). Subsequently, the second student computed special indices based on the existing anatomy items and presented this in an appropriate way to our medical domain experts.

Various tools of this application support the learning process. Every 3D object is labelled with the correct anatomical description. To see the description, you can just hover over the object of interest. In addition, it is possible to search for individual structures as well as connected systems, for example the cardiovascular system. Selecting and then deleting 3D objects enables to uncover underlying objects to see the internal structures. With a slicing tool, cross sections can be generated to divide the human body into different units.

Next Avenues
Currently a few medical professors will use and introduce this application to their medical students for educational reasons. Iterata is working on a second version for education. New linkages and combination features with real-world patient data are planned, as well as structured data entry functionalities. This would be in the form of an application in clinics to facilitate collecting medical history data of a patient. Under the title “Customized Research” Iterata started a project called “Personalization of Computational Anatomical Models”. In collaboration with our medical professors and researchers, Iterata’s roadmap will strive following topics:

- Special Indices of biological circular systems and relationships
- Computational Life Science: Combinations and expertise in computational engineering, tissue modeling, functionalized computational phantoms, regulatory processes, and standards to support design, optimization, and analysis of diagnostic and therapeutic applications
- Precision medicine: Development of customized computational treatment planning tools for therapeutic applications for hyperthermia, ultrasound, and neuromodulation treatment modalities
- In- and on-body device use: validations of functionalities in realistic complex environments
- MRI implant safety solutions and evaluations: Methodologies for assessment of health risks due to magnetic resonance imaging (MRI)
- Tissue models: collaboration with academic groups and hospitals, setup and maintain databases to material parameters of biological tissues, customized applications
- Experimental phantoms: multilayer phantoms of patients, validations of simulations, functional flows
- Functionalized human anatomical models: whole body computational human anatomical models for biomedical modeling and safety assessments

Please do not hesitate to contact us

Sincerely yours, Iterata Team
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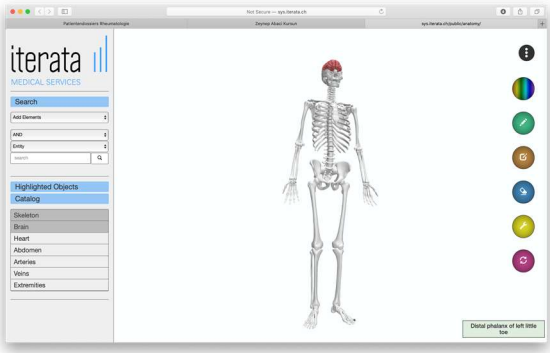
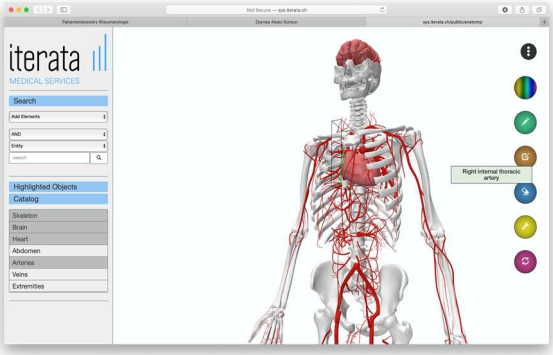
Insights & Impressions

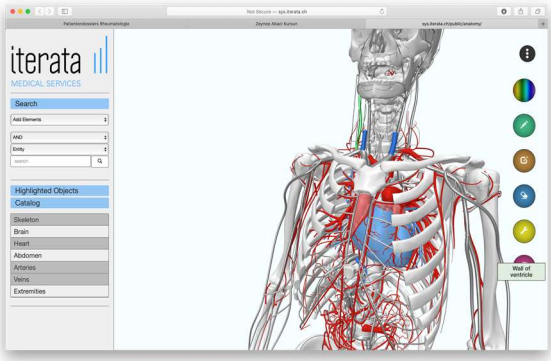
Viewer: e.g. Skeleton + Brain



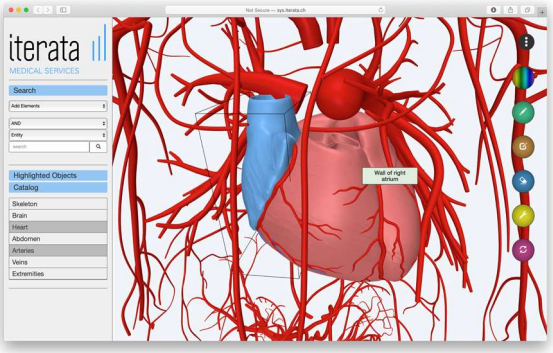
Rheumatology: e.g. Skeleton + Brain + Heart + Arteries



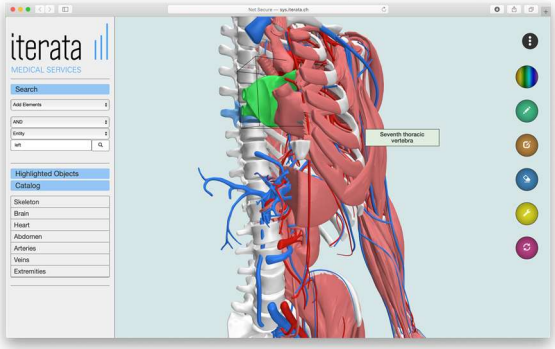
Search & Selection



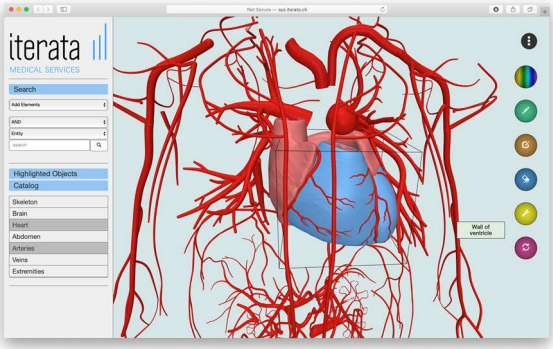
Organ Focus in Context: e.g. Heart + Arteries



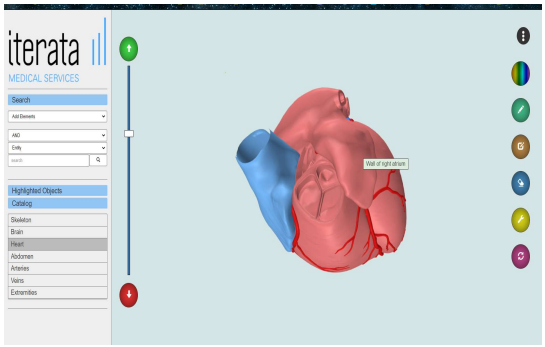
Slice & Dice



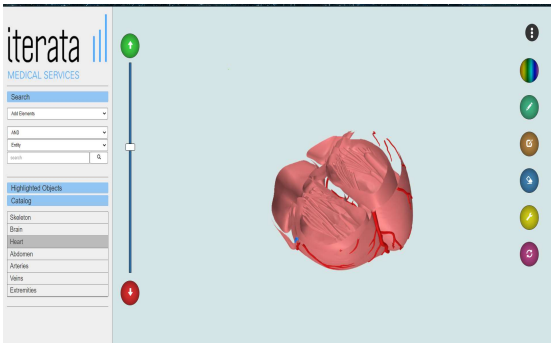
Cardiology, Heart



Zoom-in: Heart



Slice with Zoom



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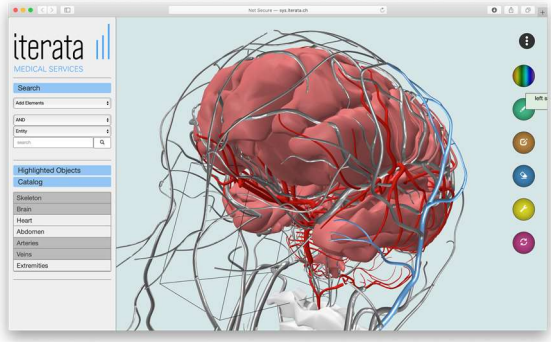
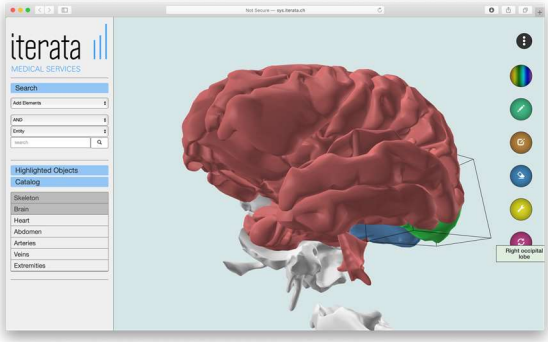
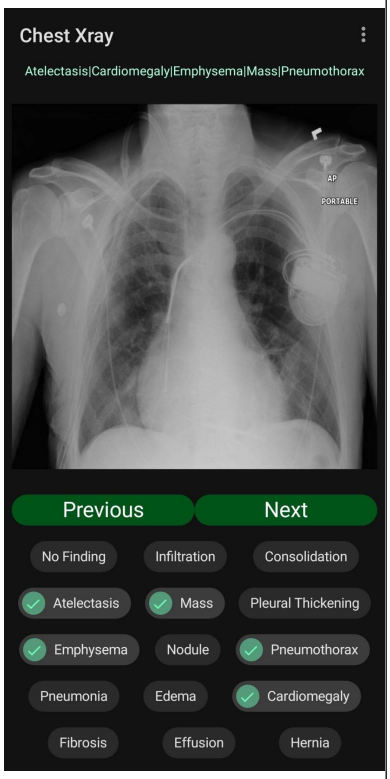
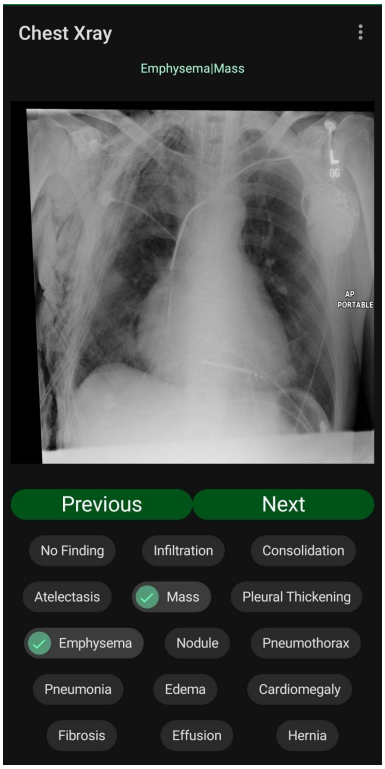
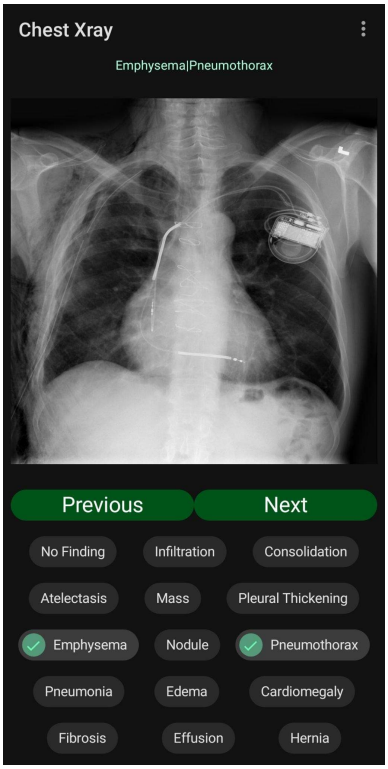
Zoom-in: e.g. Brain + Arteries + Veins	Zoom-in: e.g. Brain
	

Chest Xray: Machine Learning Validation & Classification

Source NHI: https://nihcc.app.box.com/v/ChestXray-NIHCC







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No Finding	60 361
Infiltration	19 894
Effusion	13 317
Atelectasis	11 559
Nodule	6331
Mass	5782
Pneumothorax	5302
Consolidation	4667
Pleural_Thickening	3385
Cardiomegaly	2776
Emphysema	2516
Edema	2303
Fibrosis	1686
Pneumonia	1431
Hernia	227

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No Finding	60 361
Infiltration	9547
Atelectasis	4215
Effusion	3955
Nodule	2705
Pneumothorax	2194
Mass	2139
Effusion|Infiltration	1603
Atelectasis|Infiltration	1350
Consolidation	1310
Atelectasis|Effusion	1165
Pleural_Thickening	1126
Cardiomegaly	1093
Emphysema	892
Infiltration|Nodule	829
Atelectasis|Effusion|Infiltration	737
Fibrosis	727
Edema	628
Cardiomegaly|Effusion	484
Consolidation|Infiltration	441
Infiltration|Mass	420
Effusion|Pneumothorax	403
Effusion|Mass	402
Atelectasis|Consolidation	398
Mass|Nodule	394
Edema|Infiltration	392
Infiltration|Pneumothorax	345
Emphysema|Pneumothorax	337
Consolidation|Effusion	337
Pneumonia	322