Credence Cartridge Radiomics Phantom CT Scans (CC-Radiomics-Phantom)

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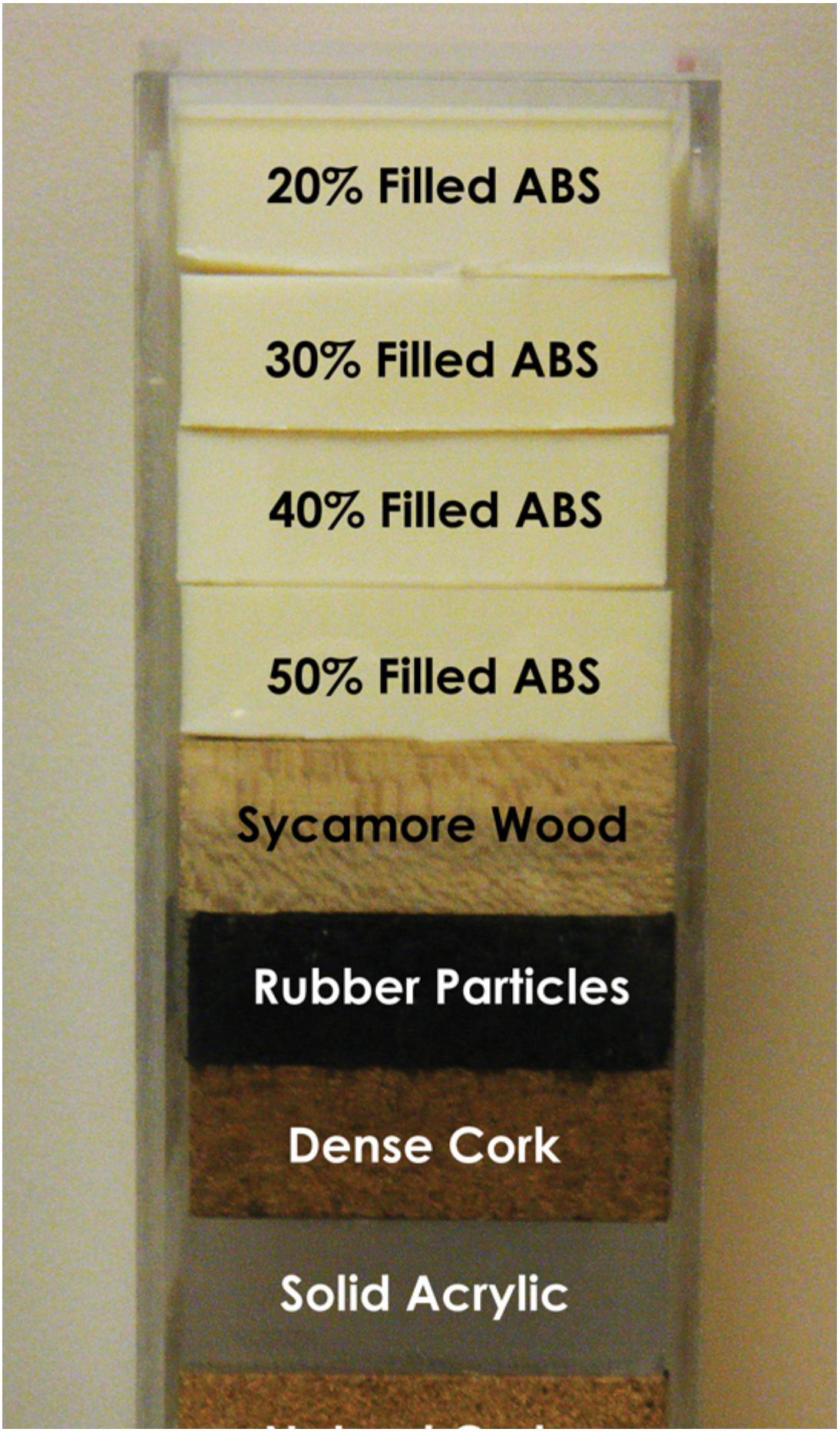
Summary

This collection consists of 17 CT scans of the Credence Cartridge Radiomics (CCR) phantom, which was designed for use in studies of texture feature robustness. The scans were acquired at four medical centers using each center's chest protocol and were taken using GE (7 scans), Philips (5 scans), Siemens (2 scans), and Toshiba (3 scans) scanners. The CCR phantom has 10 cartridges, each with a unique texture, Fig 1. The first four cartridges are 3D printed ABS plastic with 20%, 30%, 40%, and 50% honeycomb fill, and they provide regular, periodic textures. The next three cartridges provide natural textures: sycamore wood, cork, and extra dense cork. A cartridges of shredded rubber particles provides textures similar to those of non-small cell lung cancer. The ninth cartridge is solid, homogenous acrylic and provides a minimal texture control. Finally, the 10^{th} cartridge is 3D printed plaster has the highest electron density (400 – 600 HU) and is intended to more similar to bone.

In addition to the DICOM images for the 17 scans, this collection also contains two sets of contours as DICOM RT structure files. The first set provides 8x8x2 cm^3 contours for each cartridge in each scan. The second set provides 16 adjacent 2x2x2 cm^3 contours for each cartridge in each scan. Researchers studying radiomics will be able to evaluate features for robustness across a variety of scanners. Features can be calculated using the researchers own software or third party software such as IBEX (imaging biomarker explorer).

Related publications: http://journals.lww.com/investigativeradiology/Abstract/2015/11000/Measuring_Computed_Tomography_Scanner_Variability.3.aspx

The following paper was generated on different imaging modalities but the same phantom, this is a related but independent paper with a different set of authors: https://doi.org/10.1118/1.4934826



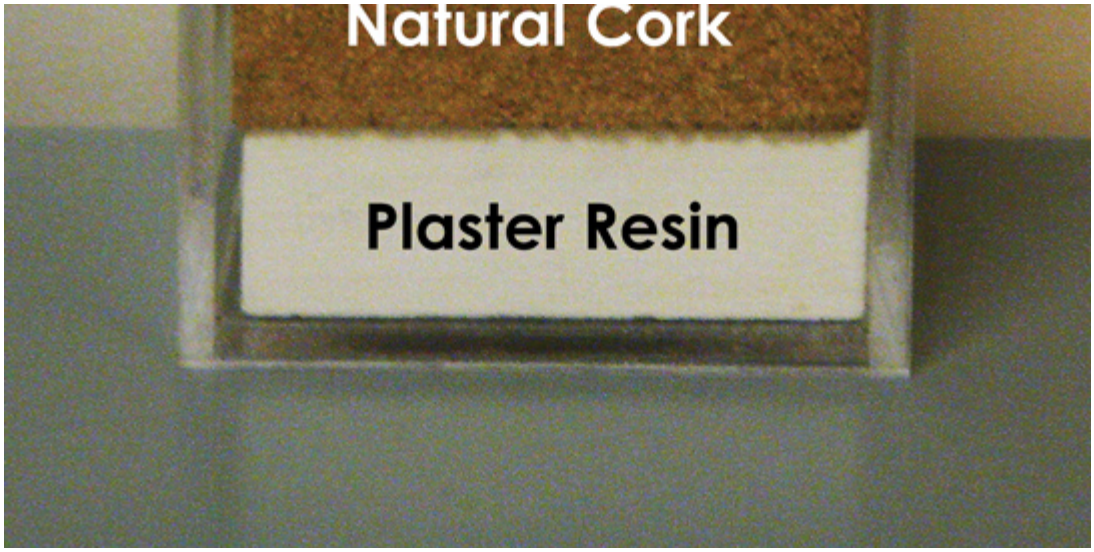


Fig. 1: The 10 cartridges of the CCR radiomics phantom.

Acknowledgments

This data set was provided to TCIA by Authors: Mackin, Dennis; Fave, Xenia; Zhang, Lifei; Fried, David; Yang, Jinzhong; Taylor, Brian; Rodriguez-Rivera, Edgardo; Dodge, Cristina; Jones, Aaron Kyle; and Court, Laurence.

Data Access

Data Access

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Detailed Description

Detailed Description

Collection Statistics	Radiology Image Statistics
Modalities	CT, RTSTRUCT
Number of Patients	17
Number of Studies	17
Number of Series	51
Number of Images	2672

Image Size (GB)	1.33

Supporting Documentation and Metadata

Acquisition parameters for the phantom scans in this Collection:

Scan	Manufacturer	Model	Kernel	Type	Slice Thickness (mm)	Pixel (mm)	Spiral Pitch Factor	kVp	Effective mAs	CTDIvol (mGy)
CCR1-GE1	GE	Discovery CT750 HD	standard	helical	2.5	0.49	0.98	120	81	6.19
CCR1-GE2	GE	Discovery CT750 HD	standard	axial	2.5	0.70	1.00	120	300	
CCR1-GE3	GE	Discovery CT750 HD	standard	helical	2.5	0.78	0.98	120	122	9.3
CCR1-GE4	GE	Discovery ST	standard	helical	2.5	0.98	1.35	120	143	16.3
CCR1-GE5	GE	LightSpeed RT	standard	helical	2.5	0.98	0.75	120	1102	53.6
CCR1-GE6	GE	LightSpeed RT16	standard	helical	2.5	0.98	0.94	120	367	18.8
CCR1-GE7	GE	LightSpeed VCT	standard	helical	2.5	0.74	0.98	120	82	
CCR1-P1	Philips	Brilliance Big Bore	B	helical	3.0	0.98	0.94	120	320	17.8
CCR1-P2	Philips	Brilliance Big Bore	C	helical	3.0	0.98	0.94	120	369	15.8
CCR1-P3	Philips	Brilliance Big Bore	B	helical	3.0	1.04	0.81	120	320	19.9
CCR1-P4	Philips	Brilliance Big Bore	B	helical	3.0	1.04	0.81	120	369	19.9
CCR1-P5	Philips	Brilliance 64	B	helical	3.0	0.98	0.67	120	372	16.4
CCR1-S1	Siemens	Sensation Open	B31s	axial	3.0	0.54	1.00	120	26 - 70	1.5
CCR1-S2	Siemens	SOMATOM Definition Flash	['I70f', '2']	helical	2.0	0.52	0.60	120	17 - 28	
CCR1-T1	Toshiba	Aquilion	FC18	helical	3.0	0.63	1.11	120	135	4.0
CCR1-T2	Toshiba	Aquilion	FC18	helical	3.0	0.63	1.11	120	135	3.8

CCR1-T3	Toshiba	Aquilion ONE	FC18	helical	3.0	0.98	0.99	120	151	13.5

Citations & Data Usage Policy

Citations & Data Usage Policy

Users must abide by the TCIA Data Usage Policy and Restrictions. Attribution should include references to the following citations:

Data Citation

Mackin, D., Ray, X., Zhang, L., Fried, D., Yang, J., Taylor, B., Rodriguez-Rivera, E., Dodge, C., Jones, A., & Court, L. (2017). **Data From Credence Cartridge Radiomics Phantom CT Scans (CC-Radiomics-Phantom) [Data set].** The Cancer Imaging Archive. https://doi.org/10.7937/K9/TCIA.2017.zuzrml5b

TCIA Citation

Clark, K., Vendt, B., Smith, K., Freymann, J., Kirby, J., Koppel, P., Moore, S., Phillips, S., Maffitt, D., Pringle, M., Tarbox, L., & Prior, F. (2013). **The Cancer Imaging Archive (TCIA): Maintaining and Operating a Public Information Repository.** In Journal of Digital Imaging (Vol. 26, Issue 6, pp. 1045–1057). Springer Science and Business Media LLC. https://doi.org/10.1007/s10278-013-9622-7 PMCID: PMC3824915

Additional Publication Resources:

The Collection authors suggest the below will give context to this dataset:

1. Mackin, D., Fave, X., Zhang, L., Fried, D., Yang, J., Taylor, B., Rodriguez-Rivera, E., Dodge, C., Jones, A. K., & Court, L. (2015). **Measuring Computed Tomography Scanner Variability of Radiomics Features.** In Investigative Radiology (Vol. 50, Issue 11, pp. 757–765). Ovid Technologies (Wolters Kluwer Health). https://doi.org/10.1097/rli.0000000000000180
2. The following paper was generated on different imaging modalities but the same phantom, this is a related but independent paper with a different set of authors:
   Fave, X., Mackin, D., Yang, J., Zhang, J., Fried, D., Balter, P., Followill, D., Gomez, D., Kyle Jones, A., Stingo, F., Fontenot, J., & Court, L. (2015). **Can radiomics features be reproducibly measured from CBCT images for patients with non-small cell lung cancer?** In Medical Physics (Vol. 42, Issue 12, pp. 6784–6797). Wiley. https://doi.org/10.1118/1.4934826

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Versions

Version 1 (Current): Updated 2017/07/28

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