Simulated data

// Metadata

Name	Simulated data
Keywords	Simulated data
Creation date	June 25h, 2012
Has contributor	Germain Forestier, Bernard Gibaud
Used ontology engineering methodology	OntoSpec
Is of type	Domain ontology
Natural language	English
Has ontology language	OntoSpec
Has formality level	Semi informal
Has reference	
Ressource locator	
Version	1.3
Number of concepts (classes)	36
Number of relations (properties)	2

Note: the document introduces first the relations defined in this ontology, then the concepts (i.e. the classes). Diagrams provide synthetic views of taxonomies. In those diagrams, links represent subsumption links (i.e. « is a » relationships), unless some other meaning is mentioned explicitly (in italics). Lines crossing two or more subsumption links depict a constraint of disjointness between the specialized classes.

// Relations

// Data properties

Has for number of planes

Properties

[EP/DR & RR] A 3D SIMULATED DATA *has for number of planes* a NUMBER OF PLANES denoted by an INT.

Comment

This relation associates to a 3D simulated data the number of planes of space explored or represented by this 3D simulated data.

Has for number of projection images

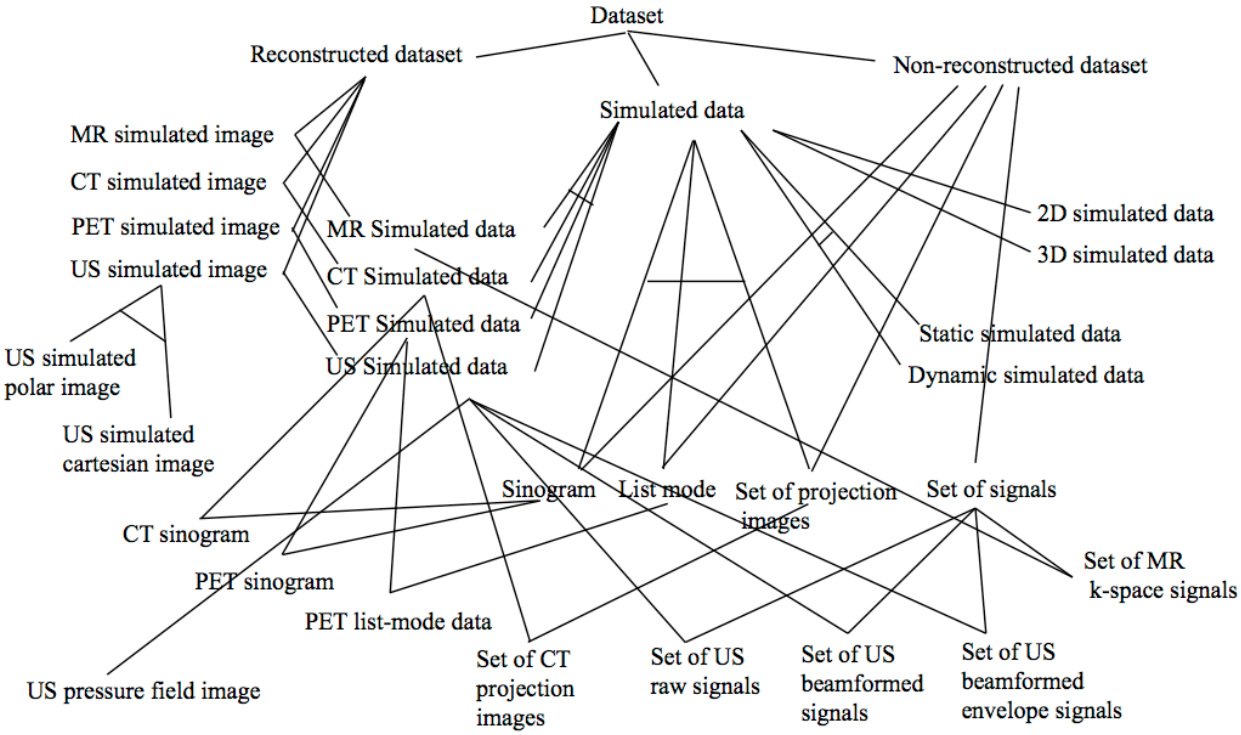
Properties

[EP/DR & RR] A SET OF PROJECTION IMAGES *has for number of projection images* a NUMBER OF PROJECTION IMAGES denoted by an INT.

Comment

This relation associates to a Set of projection images the number of projection images of this simulated data.

// Concepts



Simulated data

Meta Properties

STATIC SIMULATED DATA and DYNAMIC SIMULATED DATA *is a disjunctive sub-division of* SIMULATED DATA. SINOGRAM, LIST MODE DATA, SET OF PROJECTION IMAGES and SET OF SIGNALS *is a disjunctive sub-division of* SIMULATED DATA. MR SIMULATED DATA, CT SIMULATED DATA, PET SIMULATED DATA and US SIMULATED DATA *is a disjunctive sub-division of* SIMULATED DATA.

Properties

[EP/SL] A SIMULATED DATA *is a* DATASET. [EP/ER] A SIMULATED DATA *is the result of* some MEDICAL IMAGE SIMULATION *at* a TIME INTERVAL OR a SIMULATED DATA *is the result of* some SIMULATED DATA POST-PROCESSING *at* a TIME INTERVAL.

Comment

[DEF] A Simulated data is a Dataset representing information either derived from a model of an object through a computerized simulation process or derived from another Simulated data through a Simulated data post-processing (e.g. conversion from list-mode to sinogram, image reconstruction).

Static simulated data

Meta Properties

Properties

[EP/SL] A STATIC SIMULATED DATA *is a* SIMULATED DATA.

Comment

[DEF] A Static simulated data is a Simulated data representing information derived from a model and associated to at most one Time interval. Static simulated data are usually derived from Static object models.

Dynamic simulated data

Meta Properties

Properties

[EP/SL] A DYNAMIC SIMULATED DATA *is a* SIMULATED DATA.

Comment

[DEF] A Dynamic simulated data is a Simulated data representing information derived from a model and associated to more than one Time intervals. Dynamic simulated data are derived from Dynamic object models only.

2D simulated data

Meta Properties

Properties

[EP/SL] A 2D SIMULATED DATA *is a* SIMULATED DATA.

Comment

[DEF] A 2D simulated data is a Simulated data that explores or images a space region limited to a single plane.

3D simulated data

Meta Properties

Properties

[EP/SL] A 3D SIMULATED DATA *is a* SIMULATED DATA.

Comment

[DEF] A 3D simulated data is a Simulated data that explores or images a space region that is not limited to a single plane.

Sinogram

Meta Properties

Properties

[EP/SL] A SINOGRAM *is a* SIMULATED DATA. [EP/SL] A SINOGRAM *is a* NON-RECONSTRUCTED DATASET.

Comment

[DEF] A Sinogram is a Simulated data in which the projections obtained during the simulation are represented in an array. In 2D, this array may be expressed as $A(\phi,\zeta)$, where ϕ denotes a varying angular parameter, and ζ the distance along the projection direction. In 3D, this array may be expressed as $A(\phi,\zeta,z)$, where z denotes the longitudinal direction. In PET, it is interesting to be able to represent projections along "lines of response" that do not lie in a transaxial plane. This can be done using an array expressed as $A(\phi,\zeta,z,\delta)$, where δ denotes the "ring difference" (distance between the two rings in coincidence). Sinograms are classically used to represent Non-reconstructed images in CT and PET simulation. [REF] Defrise M, Kinahan PE, Townsend DW, Michel C, Sibomana M, Newport DF. Exact and approximate rebinning algorithms for 3-D PET data. IEEE Transactions on Medical Imaging (1997),16(2) 145:158.

List-mode data

Meta Properties

Properties

[EP/SL] A LIST-MODE DATA *is a* SIMULATED DATA. [EP/SL] A LIST-MODE DATA *is a* NON-RECONSTRUCTED DATASET.

Comment

[DEF] A List-mode data is a Simulated data in which photon emission events are recorded individually, thus providing increased flexibility in the definition of frame durations for image reconstruction. This is precious for achieving an optimal tradeoff between good counting statistics and high temporal resolution in PET imaging.

Set of projection images

Meta Properties

Properties

[EP/SL] A SET OF PROJECTION IMAGES *is a* SIMULATED DATA. [EP/SL] A SET OF PROJECTION IMAGES *is a* NON-RECONSTRUCTED DATASET.

Comment

[DEF] A set of projection images is a Simulated data obtained by computer simulation of set of 2D projections of the object model. Each projection image is a regular 2D image.

Set of signals

Meta Properties

Properties

[EP/SL] A SET OF SIGNALS *is a* SIMULATED DATA. [EP/SL] A SET OF SIGNALS *is a* NON-RECONSTRUCTED DATASET.

Comment

[DEF] A Set of signals is a Simulated data obtained by computer simulation mimicking data obtained using some acquisition device.

MR simulated data

Meta Properties

Properties

[EP/SL] An MR SIMULATED DATA *is a* SIMULATED DATA. [EP/ER] An MR SIMULATED DATA *is the result of* some MR SIMULATION *at* a TIME INTERVAL OR an MR SIMULATED DATA *is the result of* some SIMULATED DATA POST-PROCESSING *at* a TIME INTERVAL.

Comment

[DEF] An MR simulated data is a Simulated data mimicking data obtained using some MR scanner. MR simulated data are either the result of an MR simulation, or the result of some post-processing of MR simulated data.

CT simulated data

Meta Properties

Properties

[EP/SL] A CT SIMULATED DATA *is a* SIMULATED DATA. [EP/ER] A CT SIMULATED DATA *is the result of* some CT SIMULATION *at* a TIME INTERVAL OR a CT SIMULATED DATA *is the result of* some SIMULATED DATA POST-PROCESSING *at* a TIME INTERVAL.

Comment

[DEF] A CT simulated data is a Simulated data mimicking data obtained using some CT scanner. CT simulated data are either the result of a CT simulation, or the result of some post-processing of CT simulated data.

PET simulated data

Meta Properties

Properties

[EP/SL] A PET SIMULATED DATA *is a* SIMULATED DATA. [EP/ER] A PET SIMULATED DATA *is the result of* some PET SIMULATION *at* a TIME INTERVAL OR a PET SIMULATED DATA *is the result of* some SIMULATED DATA POST-PROCESSING *at* a TIME INTERVAL.

Comment

[DEF] A PET simulated data is a Simulated data mimicking data obtained using some PET scanner. PET simulated data are either the result of a PET simulation, or the result of some post-processing of PET simulated data.

US simulated data

Meta Properties

Properties

[EP/SL] An US SIMULATED DATA *is a* SIMULATED DATA. [EP/ER] An US SIMULATED DATA *is the result of* some US SIMULATION *at* a TIME INTERVAL OR an US SIMULATED DATA *is the result of* some SIMULATED DATA POST-PROCESSING *at* a TIME INTERVAL.

Comment

[DEF] An US simulated data is a Simulated data mimicking data obtained using some US equipment. US simulated data are either the result of an US simulation, or the result of some post-processing of US simulated data.

CT sinogram

Meta Properties

Properties

[EP/SL] A CT SINOGRAM *is a* CT SIMULATED DATA. A CT SINOGRAM *is a* SINOGRAM.

Comment

[DEF] A CT sinogram is a Sinogram resulting from a CT simulation.

PET sinogram

Meta Properties

Properties

[EP/SL] A PET SINOGRAM *is a* PET SIMULATED DATA. A PET SINOGRAM *is a* SINOGRAM.

Comment

[DEF] A PET sinogram is a Sinogram resulting from a PET simulation, or from the conversion of a PET List-mode data.

PET list-mode data

Meta Properties

Properties

[EP/SL] A PET LIST-MODE DATA *is a* PET SIMULATED DATA. A PET LIST-MODE DATA *is a* LIST-MODE DATA.

Comment

[DEF] A PET List-mode data is a List-mode data resulting from a PET simulation.

Set of CT projection images

Meta Properties

Properties

[EP/SL] A SET OF CT PROJECTION IMAGES *is a* CT SIMULATED DATA. A SET OF CT PROJECTION IMAGES *is a* SET OF PROJECTION IMAGES.

Comment

[DEF] A Set of CT projection images is a Set of Projection images resulting from a CT simulation, or from the conversion of a CT sinogram.

US raw signal

Meta Properties

Properties

[EP/SL] A SET OF US RAW SIGNALS *is an* US SIMULATED DATA. A SET OF US RAW SIGNALS *is a* SET OF SIGNALS.

Comment

[DEF] A Set of US raw signals is a Set of signals resulting from an US simulation.

Set of US beamformed signals

Meta Properties

Properties

[EP/SL] A SET OF US BEAMFORMED SIGNALS *is an* US SIMULATED DATA. A SET OF US BEAMFORMED SIGNALS *is a* SET OF SIGNALS.

Comment

[DEF] A set of US beamformed signals is a Set of signals resulting from an US simulation.

Set of US beamformed envelope signals

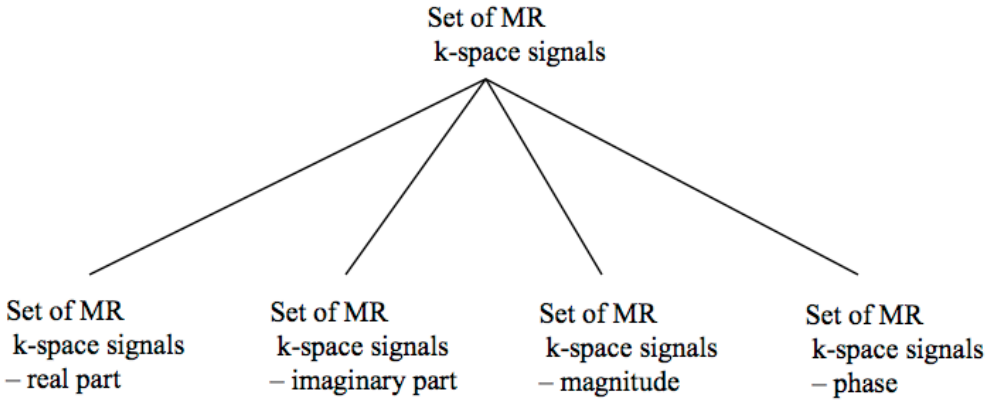
Meta Properties

Properties

[EP/SL] A SET OF US BEAMFORMED ENVELOPE SIGNALS *is an* US SIMULATED DATA. A SET OF US BEAMFORMED ENVELOPE SIGNALS *is a* SET OF SIGNALS.

Comment

[DEF] A set of US beamformed envelope signals is a Set of signals resulting from the processing of a set of US beamformed signals to extract the envelope of the signal. This is usually achieved using either of two methods: (1) computing an analytical representation of the signal via Hilbert transform; (2) demodulating the signal in baseband and applying low pass filtering to eliminate sidelobes.



Set of MR k-space signals

Meta Properties

Properties

[EP/SL] A SET OF MR K-SPACE SIGNALS *is an* MR SIMULATED DATA. A SET OF MR K-SPACE SIGNALS *is a* SET OF SIGNALS.

Comment

[DEF] A Set of MR k-space signals is a Set of signals resulting from an MR simulation mimicking the MR signal acquisition in the Fourier domain on a MR scanner.

Set of MR k-space signals – real part

Meta Properties

Properties

[EP/SL] A SET OF MR K-SPACE SIGNALS - REAL PART *is a* SET OF MR K-SPACE SIGNALS.

Comment

[DEF] A Set of MR k-space signals – real part is a Set of MR k-space signals (sometimes denoted I for “in phase”), that corresponds to the “real” part of the complex k-space data.

Set of MR k-space signals – imaginary part

Meta Properties

Properties

[EP/SL] A SET OF MR K-SPACE SIGNALS - IMAGINARY PART *is a* SET OF MR K-SPACE SIGNALS.

Comment

[DEF] A Set of MR k-space signals – imaginary part is a Set of MR k-space signals (sometimes denoted Q for "Quadrature phase", i.e. acquired with a 90° phase difference), that corresponds to the "imaginary" part of the complex k-space data.

Set of MR k-space signals – magnitude

Meta Properties

Properties

[EP/SL] A SET OF MR K-SPACE SIGNALS - MAGNITUDE *is a* SET OF MR K-SPACE SIGNALS.

Comment

[DEF] A Set of MR k-space signals – magnitude is a Set of MR k-space signals, that corresponds to the magnitude of the complex k-space data, calculated as:
Magnitude = Square-root(real-part^2 + imaginary-part^2).

Set of MR k-space signals – phase

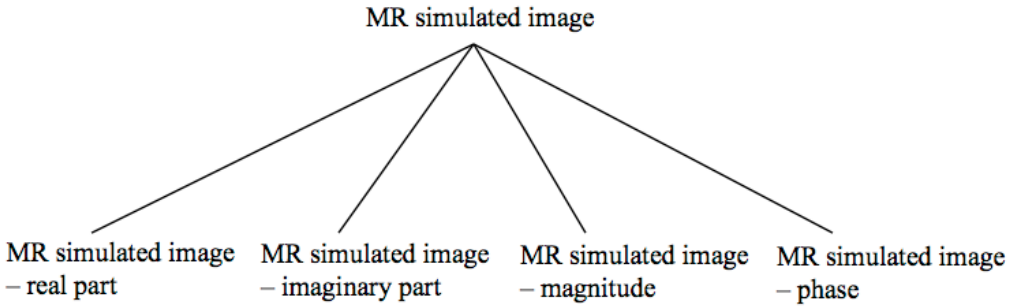
Meta Properties

Properties

[EP/SL] A SET OF MR K-SPACE SIGNALS - PHASE *is a* SET OF MR K-SPACE SIGNALS.

Comment

[DEF] A Set of MR k-space signals – phase is a Set of MR k-space signals, that corresponds to the phase of the complex k-space data, calculated as:
Phase = Arctangent (imaginary-part / real-part).



MR simulated image

Meta Properties

Properties

[EP/SL] An MR SIMULATED IMAGE *is an* MR SIMULATED DATA. An MR SIMULATED IMAGE *is a* RECONSTRUCTED DATASET.

Comment

[DEF] An MR simulated image is a MR simulated data mimicking an image obtained using some MR scanner. MR simulated images are either the result of an MR simulation, or the result of a reconstruction from MR simulated data.

MR simulated image – real part

Meta Properties

Properties

[EP/SL] An MR SIMULATED IMAGE - REAL PART *is an* MR SIMULATED IMAGE. An MR SIMULATED IMAGE - REAL PART *is an* MR SIMULATED IMAGE.

Comment

[DEF] An MR simulated image – real part is an MR simulated image that corresponds to the real part of a reconstructed complex MR image. This complex image is obtained by Discrete Fourier Transform of measured k-space data.

MR simulated image – imaginary part

Meta Properties

Properties

[EP/SL] An MR SIMULATED IMAGE - IMAGINARY PART *is an* MR SIMULATED IMAGE. An MR SIMULATED IMAGE - IMAGINARY PART *is an* MR SIMULATED IMAGE.

Comment

[DEF] An MR simulated image – imaginary part is an MR simulated image that corresponds to the imaginary part of a reconstructed complex MR image. This complex image is obtained by Discrete Fourier Transform of measured k-space data.

MR simulated image – magnitude

Meta Properties

Properties

[EP/SL] An MR SIMULATED IMAGE - MAGNITUDE *is an* MR SIMULATED IMAGE. An MR SIMULATED IMAGE - MAGNITUDE *is an* MR SIMULATED IMAGE.

Comment

[DEF] An MR simulated image – magnitude is an MR simulated image that corresponds to the magnitude of a reconstructed complex MR image, calculated as:
Magnitude = Square-root(real-part^2 + imaginary-part^2).

MR simulated image – phase

Meta Properties

Properties

[EP/SL] An MR SIMULATED IMAGE - PHASE *is an* MR SIMULATED IMAGE. An MR SIMULATED IMAGE - PHASE *is an* MR SIMULATED IMAGE.

Comment

[DEF] An MR simulated image – phase is an MR simulated image that corresponds to the phase of a reconstructed complex MR image, calculated as:
Phase = Arctangent (imaginary-part / real-part).

CT simulated image

Meta Properties

Properties

[EP/SL] A CT SIMULATED IMAGE *is a* CT SIMULATED DATA. A CT SIMULATED IMAGE *is a* RECONSTRUCTED DATASET.

Comment

[DEF] A CT simulated image is a CT simulated data mimicking an image obtained using some CT scanner. CT simulated images are either the result of a CT simulation, or the result of a reconstruction from CT simulated data.

PET simulated image

Meta Properties

Properties

[EP/SL] A PET SIMULATED IMAGE *is a* PET SIMULATED DATA. A PET SIMULATED IMAGE *is a* RECONSTRUCTED DATASET.

Comment

[DEF] A PET simulated image is a PET simulated data mimicking an image obtained using some PET scanner. PET simulated images are either the result of a PET simulation, or the result of a reconstruction from PET simulated data.

US simulated image

Meta Properties

Properties

[EP/SL] An US SIMULATED IMAGE *is an* US SIMULATED DATA. An US SIMULATED IMAGE *is a* RECONSTRUCTED DATASET. US SIMULATED POLAR IMAGE and US SIMULATED CARTESIAN IMAGE *is a disjunctive sub-division of* US SIMULATED IMAGE.

Comment

[DEF] An US simulated image is an US simulated data mimicking an image obtained using some US equipment. US simulated images are either the result of an US simulation, or the result of a reconstruction from US simulated data.

US simulated polar image

Meta Properties

Properties

[EP/SL] An US SIMULATED POLAR IMAGE *is an* US SIMULATED IMAGE.

Comment

[DEF] In 2D, an US simulated polar image in an US simulated image whose sampling is represented as a 2D-array $I(\theta,\rho)$, where θ denotes a varying angular parameter, and ρ the distance along the scanning direction.

US simulated cartesian image

Meta Properties

Properties

[EP/SL] An US SIMULATED CARTESIAN IMAGE *is an* US SIMULATED IMAGE.

Comment

[DEF] In 2D, an US simulated cartesian image in an US simulated image whose sampling is represented as a 2D-array I(x,y), where x and y denote cartesian coordinates.

US pressure field image

Meta Properties

Properties

[EP/SL] An US PRESSURE FIELD IMAGE *is an* US SIMULATED DATA. An US PRESSURE FIELD IMAGE *is a* RECONSTRUCTED DATASET.

Comment

[DEF] An US pressure field image in an US simulated data denoting the pressure field throughout the object model as a result of ultrasound scanning. An US pressure field image is a result of an US simulation.