DICOM Correction Proposal

STATUS	Assigned
Date of Last Update	2016/09/15
Person Assigned	Wim Corbijn
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Submission Date	2015/09/11

Correction Number CP-1584
Log Summary: Allow Palette Color in Parametric Map
Name of Standard PS3.3, PS3.6, PS3.17
Rationale for Correction: Parametric Maps should allow a default presentation using a palette color LUT defined in the object. Allowing the definition of the range of non-integer values to be mapped to the Color LUT, which is closely related to the type of parametric map.
Correction Wording:

Item #1: Amend PS3.3 A.58.1 Add parametric map to Color Palette IOD Description

A.58 Color Palette IOD

A.58.1 Color Palette IOD Description

A Color Palette entity specifies a color palette suitable for application to a grayscale image **or parametric map**.

Item #2: Amend PS3.3 A.75.1 Remove restriction on Color usage

A.75.1 Parametric Map IOD Description

The Parametric Map Information Object Definition (IOD) specifies a multi-frame image representing pixels with real world values. Parametric Maps are either integer or floating point.

The Parametric Map IOD does not include the full set of acquisition parameters of any acquired images from which they were derived, e.g., cardiac phase. An application rendering or processing the Parametric Map may need to access the source images for such information.

The Parametric Map IOD requires the presence of VOI LUT (window) information with the intent that at a minimum the image be renderable without special processing. The output space is defined as P-Values to achieve consistency.

Note

• The VOI LUT mechanism specifically supports floating point values, and there is no expectation that it be limited to integer input or output ranges.

- Even though the output of the VOI LUT is not constrained to be integer values, implicit scaling of the output range to the input range of an integer-based Palette Color LUT can be used to apply pseudo-color for display. ~~**No pseudo-color mapping information is encoded with the image. This may be applied at the discretion of the receiving application whether it uses a separate DICOM Color Palette IOD or some other mechanism. Pseudo color is supplied but free to override.**~~

Item #3: Amend PS3.3 Adapt Table A.75-1 to add Supplemental Palette Color Lookup Table

A.75.3 Parametric Map IOD Module Table

Table A.75-1. Parametric Map IOD Modules

IE	Module	Reference	Usage
Patient	Patient	C.7.1.1	M
	Clinical Trial Subject	C.7.1.3	U
Study	General Study	C.7.2.1	M
	Patient Study	C.7.2.2	U
	Clinical Trial Study	C.7.2.3	U
Series	General Series	C.7.3.1	M
	Parametric Map Series	C.8.32.1	M
	Clinical Trial Series	C.7.3.2	U
Frame of Reference	Frame of Reference	C.7.4.1	M
Equipment	General Equipment	C.7.5.1	M
	Enhanced General Equipment	C.7.5.2	M
Image	General Image	C.7.6.1	M
	Image Pixel	C.7.6.3	C - Required if integer pixels
	Floating Point Image Pixel	C.7.6.24	C - Required if 32 bit floating point pixels
	Double Floating Point Image Pixel	C.7.6.25	C - Required if 64 bit floating point pixels
	Parametric Map Image	C.8.32.2	M
	Multi-frame Functional Groups	C.7.6.16	M
	Multi-frame Dimension	C.7.6.17	M
	Palette Color Lookup Table	**C.7.9**	**C - Required if Pixel Presentation (0008,9205) in the Parametric Map image Module equals PARAMETRIC COLOR and Palette Color Lookup Table UID (0028,1199) is not present.**

IE	Module	Reference	Usage
	Cardiac Synchronization	C.7.6.18.1	U
	Respiratory Synchronization	C.7.6.18.2	U
	Bulk Motion Synchronization	C.7.6.18.3	U
	Acquisition Context	C.7.6.14	M
	Device	C.7.6.12	U
	Specimen	C.7.6.22	U
	Common Instance Reference	C.12.2	C - Required if Referenced Image Functional Group (Section C.7.6.16.2.5) or Derivation Image Functional Group (Section C.7.6.16.2.6) is present.
	SOP Common	C.12.1	M
	Frame Extraction	C.12.3	C - Required if the SOP Instance was created in response to a Frame-Level retrieve request

Item #4: Amend PS3.3 Adapt Table A.75-2 to add Stored Value Color Range Macro

A.75.5 Parametric Map Functional Groups

Table A.75-2 specifies the use of the Functional Group Macros used in the Multi-frame Functional Groups Module for the Parametric Map IOD.

Table A.75-2. Parametric Map Functional Group Macros

Functional Group Macro	Section	Usage
….		
Parametric Map Frame Type	C.8.32.3.1	M
Stored Value Color Range	**C.11.x**	**C - Required if Pixel Presentation (0008,9205) in the Parametric Map Image Module equals PARAMETRIC_COLOR**

Item #5: Amend PS3.3 Adapt Table A.75-1 to add Supplemental Palette Color Lookup Table

C.7.6.24 Floating Point Image Pixel Module

Table C.7.6.24-1 describes the Floating Point Image Pixel Module. This module differs from the Section C.7.6.3 Image Pixel Module in that:

• instead of integer stored pixel values, float stored pixel values are used

• Bits Stored (0028,0101) and High Bit (0029,0102) are not used because the stored pixel values always occupy the entire word

• Pixel Representation (0028,0103) is not used because the stored pixel values are always signed

• Photometric Interpretation is constrained

~~• color palette tables are not used~~
• Pixel Data Provider URL (0028,7FE0) is not used

Item #6: Amend PS3.3 Adapt Table A.75-1 to add Supplemental Palette Color Lookup Table

C.8.32.2 Parametric Map Image Module

Table C.8.32-2 defines the general Attributes of the Parametric Map Image Module.

Table C.8.32-2. Parametric Map Image Module Attributes

Attribute Name	Tag	Type	Attribute Description
Pixel Presentation	**(0008,9205)**	**3**	**Indication of the presence or absence of color information that may be used during rendering.** **Enumerated Values:** **PARAMETRIC_COLOR A Palette Color LUT is supplied or referenced. Image is best displayed ~~in color~~ using that Palette Color LUT, but can be displayed in grayscale if current display does not support color** **MONOCHROME2 No Palette Color LUT is supplied. Image is intended to be displayed in grayscale only. ~~No Palette Color LUT is supplied~~**
Palette Color Lookup Table UID	**(0028,1199)**	**1C**	**Palette Color Lookup Table UID. See Section C.7.9.1 for further explanation.** **Required if Pixel Presentation (0008,9205) ~~in the Parametric Map image Module~~ equals PARAMETRIC_COLOR and Palette Color Lookup Table Module attributes are~~is~~ not present.**
ICC Profile	**(0028,2000)**	**1C**	**An ICC Profile encoding the transformation of device-dependent color stored pixel values into PCS-Values.** **~~When present,~~ Defines the color space of the output of the Parametric Map.** **See C.11.15.1.1** **Required if Pixel Presentation (0008,9205) has a value of PARAMETRIC_COLOR.**

Item #8: Amend PS3.3 Add new section C.11.x

C.11.x Stored Value Color Range Module

Table C.11.x-1 defines the Attributes of the Stored Value Color Range Module.

Table C.11.x-1. Stored Value Color Range Module Attributes

Attribute Name	Tag	Type	Attribute Description
Minimum Stored Value Mapped	(0028,xxx1)	1	Minimum Stored Value to map. See C.11.x.1.
Maximum Stored Value Mapped	(0028,xxx2)	1	Maximum Stored Value to map. See C.11.x.1.

C.11.x.1 Stored Value Color Range Module Attribute Description

The voxel values of the Parametric Map shall be mapped to RGB values using the following transformation.

All values smaller than Minimum Stored Value Mapped (0028,xxx1) shall be treated as equal to this minimum value.

All values larger than Maximum Stored Value Mapped (0028,xxx2) shall be treated as equal to this maximum value.

The values between Minimum Stored Value Mapped (0028,xxx1) and Maximum Stored Value Mapped (0028,xxx2) shall be mapped to the Color or Supplemental Palette Color LUT using a linear interpolation function.

Note: Color LUT can be segmented and interpolation must accommodate the segmentation.

In case of floating point mapping the second value of the color LUT descriptor is not used in the mapping as the Minimum Stored Value Mapped (0028,xxx1) is used as start value for the LUT values.

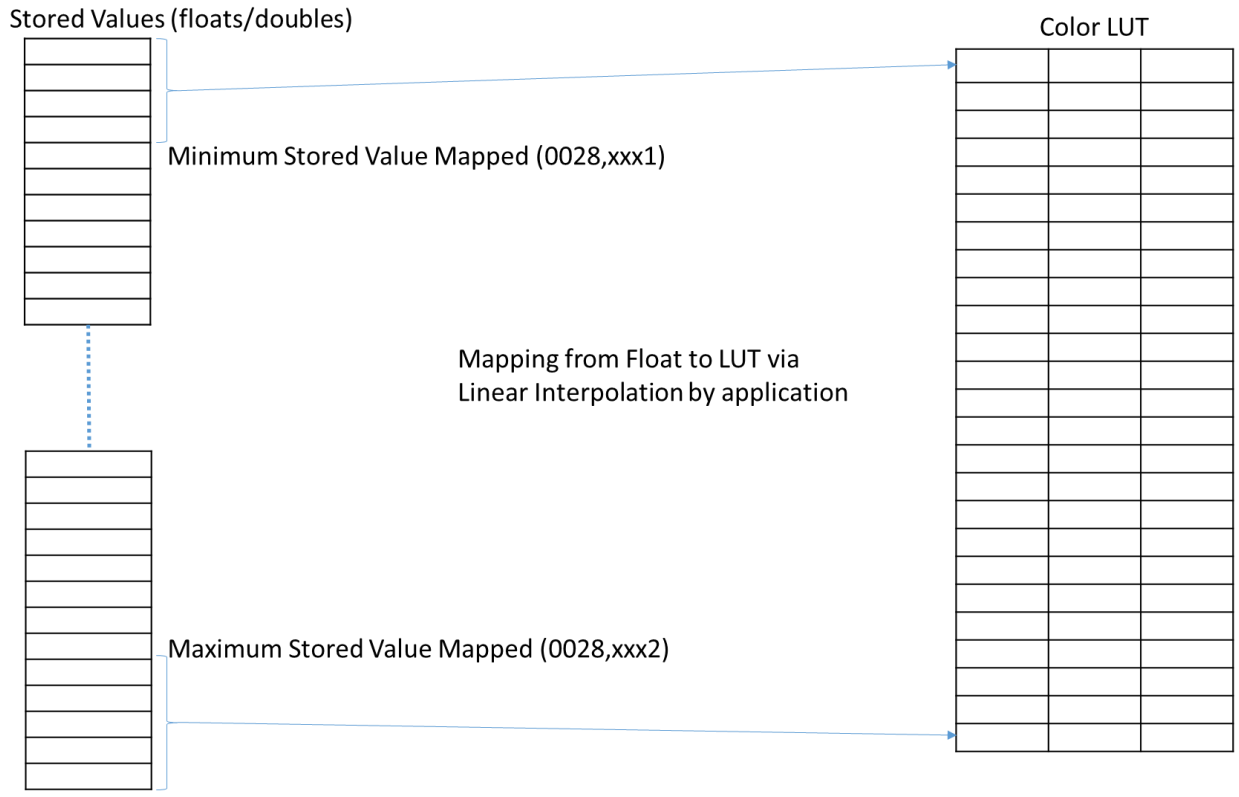

Figure C.11.x.2-1

PS 3.6 Add the following rows to Section 6

Tag	Name	Keyword	VR	VM
(0028,xxx1)	Minimum Stored Value Mapped	MinimumStoredValueMapped	FD	1
(0028,xxx2)	Maximum Stored Value Mapped	MaximumStoredValueMapped	FD	1

PS 3.6 Add the following rows to Annex A Registry of DICOM Unique Identifiers

A Registry of DICOM Unique Identifiers (UIDs) (Normative)

Table A-1 lists the UID values that are registered and used throughout the Parts of the DICOM Standard. This central registry ensures that when additional UIDs are assigned, non-duplicate values are assigned.

Table A-1. UID Values

UID Value	UID Name	UID Type	Part
…..			
1.2.840.10008.1.5.4	PET 20 Step Color Palette SOP Instance	Well-known SOP Instance	PS 3.6
1.2.840.10008.1.5.x	**SPRING Color Palette SOP Instance**	**Well-known SOP Instance**	**PS 3.6**
1.2.840.10008.1.5.y	**SUMMER Color Palette SOP Instance**	**Well-known SOP Instance**	**PS 3.6**
1.2.840.10008.1.5.w	**FALL Color Palette SOP Instance**	**Well-known SOP Instance**	**PS 3.6**
1.2.840.10008.1.5.z	**WINTER Color Palette SOP Instance**	**Well-known SOP Instance**	**PS 3.6**
…..			

PS 3.6 Add the following rows to Table B.1-1 Standard Color Palettes

B.1 Standard Color Palettes

Table B.1-1 lists the color palettes that are defined by the DICOM Standard.

Table B.1-1. Standard Color Palettes

Well-known SOP Instance UID	Content Label (0070,0080)	Content Description (0070,0081)	Section	URL of Reference Encoded Instance
1.2.840.10008.1.5.1	HOT_IRON	Hot Iron	B.1.1	ftp://medical.nema.org/Medical/Dicom/Palettes/hotiron.dcm
1.2.840.10008.1.5.2	PET	PET	B.1.2	ftp://medical.nema.org/Medical/Dicom/Palettes/pet.dcm
1.2.840.10008.1.5.3	HOT_METAL_BLUE	Hot Metal Blue	B.1.3	ftp://medical.nema.org/Medical/Dicom/Palettes/ hotmetalblue.dcm
1.2.840.10008.1.5.4	PET_20_STEP	PET 20 Step	B.1.4	ftp://medical.nema.org/Medical/Dicom/Palettes/ pet20step.dcm
1.2.840.10008.1.5.x	**SPRING**	**Spring**	**B.1.X**	**ftp://medical.nema.org/Medical/Dicom/Palettes/ spring.dcm**
1.2.840.10008.1.5.y	**SUMMER**	**Summer**	**B.1.Y**	**ftp://medical.nema.org/Medical/Dicom/Palettes/ summer.dcm**
1.2.840.10008.1.5.w	**FALL**	**Fall**	**B.1.W**	**ftp://medical.nema.org/Medical/Dicom/Palettes/ fall.dcm**
1.2.840.10008.1.5.z	**WINTER**	**Winter**	**B.1.Z**	**ftp://medical.nema.org/Medical/Dicom/Palettes/ winter.dcm**

PS 3.6 Add the following new section B.1.X

B.1.X Spring Color Palette

B.1.X.1 SPRING Color Palette Description (Informative)

The SPRING Color Palette is suggested for use in color fMRI activation maps. It shades from one pastel color to another which is distinctly different, making it suitable for illustrating either unipolar or bipolar activation. As part of a complementary set of color palettes (Spring, Summer, Fall, Winter), it conveys activation strength within one statistical parametric map, while making it possible for the human observer to distinguish between different fMRI activation maps in the same blended display. A typical example is illustrated in Figure B.1.X.1-1.

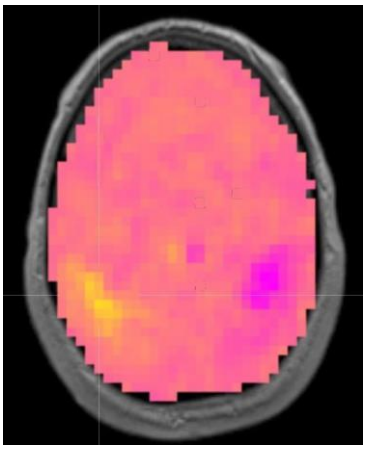

Figure B.1.X.1-1. MR image SPRING LUT Palette applied.

B.1.X.2 SPRING Color Palette Definition

The ICC Profile shall define the sRGB space.

The value of Content Label (0070,0080) shall be "SPRING".

This color palette is defined to contain the values for Red Palette Color Lookup Table Descriptor (0028,1101), Green Palette Color Lookup Table Descriptor (0028,1102) and Blue Palette Color Lookup Table Descriptor (0028,1103) defined in Table B.1.X.2-1.

Table B.1.X.2-1. SPRING Color Palette Descriptor

Value 1 (Number of entries)	Value 2 (First value mapped)	Value 3 (Number of bits)
256	0	8

This color palette is defined using the segmented lookup table data specified in Table B.1.X.2-3, where the values in the columns Red, Green and Blue are the values of the Segmented Red Palette Color Lookup Table Data (0028,1221), Segmented Green Palette Color Lookup Table Data (0028,1222) and Segmented Blue Palette Color Lookup Table Data (0028,1223), respectively.

Table B.1.X.2-2. SPRING Segmented Color Palette Data

Red	Green	Blue
0	**0**	**0**
1	**1**	**1**
255	**0**	**255**
1	**1**	**1**
255	**255**	**255**
255	**255**	**0**

PS 3.6 Add the following new section B.1.Y

B.1.Y SUMMER Color Palette

B.1.Y.1 SUMMER Color Palette Description (Informative)

The SUMMER Color Palette is suggested for use in color fMRI activation maps. It shades from one pastel color to another which is distinctly different, making it suitable for illustrating either unipolar or bipolar activation. As part of a complementary set of color palettes (Spring, Summer, Fall, Winter), it conveys activation strength within one statistical parametric map, while making it possible for the human observer to distinguish between different fMRI activation maps in the same blended display. A typical example is illustrated in Figure B.1.Y.1-1.

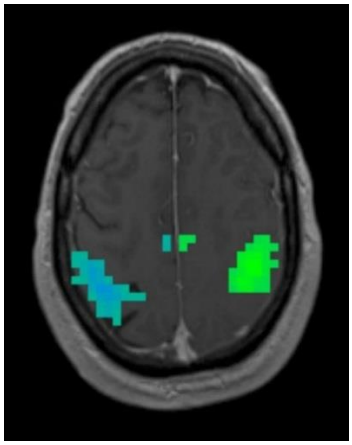

Figure B.1.Y.1-1. MR image SUMMER Palette applied.

B.1.Y.2 SUMMER LUT Color Palette Definition

The ICC Profile shall define the sRGB space.

The value of Content Label (0070,0080) shall be "SUMMER".

This color palette is defined to contain the values for Red Palette Color Lookup Table Descriptor (0028,1101), Green Palette Color Lookup Table Descriptor (0028,1102) and Blue Palette Color Lookup Table Descriptor (0028,1103) defined in Table B.1.Y.2-1.

Table B.1.Y.2-1. SUMMER Color Palette Descriptor

Value 1 (Number of entries)	Value 2 (First value mapped)	Value 3 (Number of bits)
256	0	8

This color palette is defined using the segmented lookup table data specified in Table B.1.Y.2-3, where the values in the columns Red, Green and Blue are the values of the Segmented Red Palette Color Lookup Table Data (0028,1221), Segmented Green Palette Color Lookup Table Data (0028,1222) and Segmented Blue Palette Color Lookup Table Data (0028,1223), respectively.

Table B.1.Y.2-3. SUMMER Segmented Color Palette Data

Red	Green	Blue
0	0	0
1	1	1
0	255	0
1	1	1
255	255	127
0	128	0
		1
		128
		254

PS 3.6 Add the following new section B.1.W

B.1.W FALL Color Palette

B.1.W.1 FALL Color Palette Description (Informative)

The FALL Color Palette is suggested for use in color fMRI activation maps. It shades from one pastel color to another which is distinctly different, making it suitable for illustrating either unipolar or bipolar activation. As part of a complementary set of color palettes (Spring, Summer, Fall, Winter), it conveys activation strength within one statistical parametric map, while making it possible for the human observer to distinguish between different fMRI activation maps in the same blended display. A typical example is illustrated in Figure B.1.W.1-1.

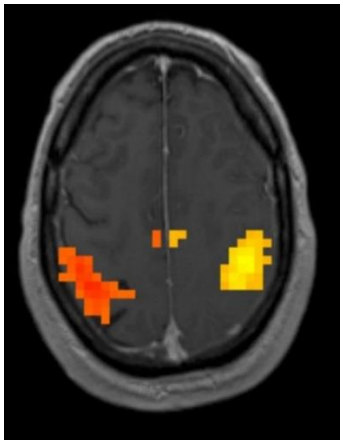

Figure B.1.W.1-1. MR image FALL Palette applied.

B.1.W.2 FALL Color Palette Definition

The ICC Profile shall define the sRGB space.

The value of Content Label (0070,0080) shall be "FALL".

This color palette is defined to contain the values for Red Palette Color Lookup Table Descriptor (0028,1101), Green Palette Color Lookup Table Descriptor (0028,1102) and Blue Palette Color Lookup Table Descriptor (0028,1103) defined in Table B.1.W.2-1.

Table B.1.W.2-1. FALL Color Palette Descriptor

Value 1 (Number of entries)	Value 2 (First value mapped)	Value 3 (Number of bits)
256	0	8

This color palette is defined using the segmented lookup table data specified in Table B.1.W.2-3, where the values in the columns Red, Green and Blue are the values of the Segmented Red Palette Color Lookup Table Data (0028,1221), Segmented Green Palette Color Lookup Table Data (0028,1222) and Segmented Blue Palette Color Lookup Table Data (0028,1223), respectively.

Table B.1.W.2-3. FALL Segmented Color Palette Data

Red	Green	Blue
0	**0**	**0**
1	**1**	**1**
255	**255**	**0**
1	**1**	**1**
255	**255**	**255**
255	**0**	**0**

PS 3.6 Add the following new section B.1.Z

B.1.Z WINTER Color Palette

B.1.Z.1 WINTER Color Palette Description (Informative)

The WINTER Color Palette is suggested for use in color fMRI activation maps. It shades from one pastel color to another which is distinctly different, making it suitable for illustrating either unipolar or bipolar activation. As part of a complementary set of color palettes (Spring, Summer, Fall, Winter), it conveys activation strength within one statistical parametric map, while making it possible for the human observer to distinguish between different fMRI activation maps in the same blended display. A typical example is illustrated in Figure B.1.Z.1-1.

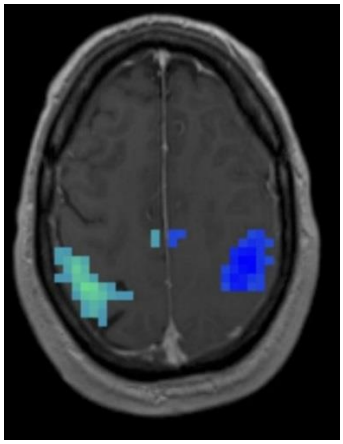

Figure B.1.Z.1-1. MR image WINTER Palette applied.

B.1.Z.2 WINTER Color Palette Definition

The ICC Profile shall define the sRGB space.

The value of Content Label (0070,0080) shall be "WINTER".

This color palette is defined to contain the values for Red Palette Color Lookup Table Descriptor (0028,1101), Green Palette Color Lookup Table Descriptor (0028,1102) and Blue Palette Color Lookup Table Descriptor (0028,1103) defined in Table B.1.Z.2-1.

Table B.1.Z.2-1. WINTER Color Palette Descriptor

Value 1 (Number of entries)	Value 2 (First value mapped)	Value 3 (Number of bits)
256	0	8

This color palette is defined using the segmented lookup table data specified in Table B.1.Z.2-3, where the values in the columns Red, Green and Blue are the values of the Segmented Red Palette Color Lookup Table Data (0028,1221), Segmented Green Palette Color Lookup Table Data (0028,1222) and Segmented Blue Palette Color Lookup Table Data (0028,1223), respectively.

Table B.1.Z.2-3. WINTER Segmented Color Palette Data

Red	Green	Blue
0	**0**	**0**
1	**1**	**1**
0	**0**	**255**
1	**1**	**1**
127	**255**	**255**
0	**255**	**128**
1		
128		
127		

Item PS3.6: Append table B.2.1-1 with localization for French

B.2.1 French

Table B.2.1-1. French Standard Color Palette Description Values

Content Label (0070,0080)	English Value of Content Description (0070,0081)	French Value of Content Description (0070,0081)
HOT_IRON	Hot Iron	Hot Iron
PET	PET	TEP
HOT_METAL_BLUE	Hot Metal Blue	Hot Metal Blue
PET_20_STEP	PET 20 Step	TEP Vingt étapes
SPRING	**Spring**	**Printemps**
SUMMER	**Summer**	**Été**
FALL	**Fall**	**Automne**
WINTER	**Winter**	**Hiver**

Item PS3.6: Append table B.2.2-1 with localization for German

B.2.2 German

Table B.2.2-1. German Standard Color Palette Description Values

Content Label (0070,0080)	English Value of Content Description (0070,0081)	German Value of Content Description (0070,0081)
HOT_IRON	Hot Iron	Heisses Eisen
PET	PET	PET
HOT_METAL_BLUE	Hot Metal Blue	Heisses Metallblau
PET_20_STEP	PET 20 Step	PET 20 Schritte
SPRING	**Spring**	**Frühling**
SUMMER	**Summer**	**Sommer**
FALL	**Fall**	**Herbst**
WINTER	**Winter**	**Winter**

Item PS3.17: Add new Annex XXXX

XXXX Color information for Parametric Object

XXXX.1 Introduction

Functional imaging can create Parametric Maps showing a functional relation between the anatomical region and the specific functional activity. For display purposes it is useful to show this functional activity with the use of a color LUT on the related anatomical image. To be able to do this it is necessary to include a Supplemental Palette Supplemental Palette Color Lookup Table for the Parametric Map and define how to map the (floating point) values to a specific RGB value.

For a correct mapping it is important to know what range of continues values needs to be mapped to the discrete range of RGB values of the LUT. For this the Minimum Stored Value Mapped (0028,xxx1) and the Maximum Stored Value Mapped (0028,xxx2) are defined. All values between the minimum and maximum will be distributed in a linear manner to the Supplemental Palette Color Lookup Table that is supplied.

The usage of floating point values for the stored values removes the need for a Real World Value transformation other than the identity transformation.

This example illustrates BOLD fMRI activation data for a bipolar motor paradigm stored as a floating point parametric map encoding ‘t’ (statistical) Real World Values. Each voxel’s value represents how well the BOLD time series information at that location of the brain fits the general linear model (GLM) of the fMRI block paradigm pattern (right or left versus control, no movement). Right and left have been encoded as positive and negative t values, respectively.

The Double Float Minimum Stored Value Mapped and Maximum Stored Value Mapped in this case are -16.739 and 21.434, respectively. This range will be mapped to the low and high ends of the LUT applied to this activation map. In this case the Minimum Stored Value Mapped and Maximum Stored Value Mapped are equal to the RWV Minimum and Maximum, respectively, in the activation map data. Note several compelling reasons for the range to be different from the RWV Minimum and RWV Maximum:

1) Centering the RWV zero value on some desired index of the LUT; e.g. choosing -21.434 to +21.434 to properly center RWV zero on the middle of the LUT (presumably to match the LUT design).
2) Choosing a narrower range of Minimum Stored Value Mapped and/or Maximum Stored Value Mapped (negative and/or positive), i.e., windowing, to maximize the dynamic range of the LUT for critical RWV range(s).
3) Specifying a predetermined Minimum Stored Value Mapped and Maximum Stored Value Mapped regardless of the actual RWV data, in order to have key RWV transitions match LUT color effects, e.g. generally accepted hyperperfusion and hypoperfusion transition points in cerebral blood flow (CBF) maps.

For the purpose of this example, the full RWV range of the activation map is appropriate to display with the full range of the Spring Color Palette.

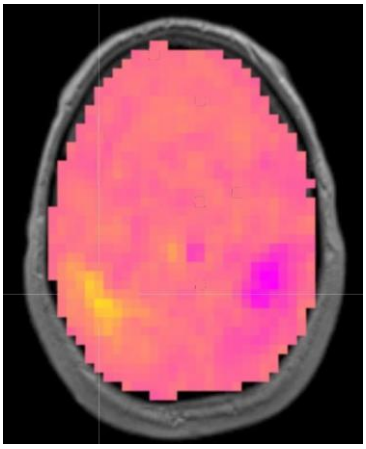

Figure XXXX.1-1 Color Parametric Map on top of an anatomical image

As the activation map without threshold suggests, areas outside the brain have been masked off. These would be coded with Padding values in the parametric map.

Thresholding (not part of the parametric map) will be applied for positive and/or negative ranges. Note that this operation does not change the color mapping (i.e. RWV x corresponds to LUT entry j) but only the opacity of voxels outside the range (forcing A=0 or transparent).

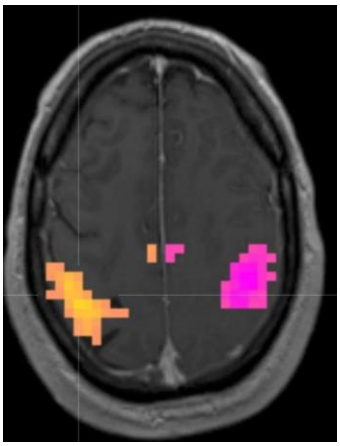

Figure XXXX.1-2 Color Parametric Map with threshold applied on top of an anatomical image

Other visualization methods such as smoothing and overall opacity may be applied to the colored, thresholded activation map.

XXXX.2 Encoding Example (Informative)

This section illustrates the usage of the Color LUT in the context of a Parametric MAP IOD with the Palette Color Lookup Table for the example described.

Table XXXX-2.1. Example data for the Floating Point Image Pixel Module

Name	Tag	Value	Comment
Samples per Pixel	(0028,0002)	1	
Photometric Interpretation	(0028,0004)	PARAMETRIC_COLOR	

Name	Tag	Value	Comment
Rows	(0028,0010)	41	
Columns	(0028,0011)	32	This case is a non-square image
Bits Allocated	(0028,0100)	32	
Pixel Aspect Ratio	(0028,0034)	1/1	
Float Pixel Padding Value	(0028,0122)	-200	
Float Pixel Padding Range Limit	(0028,0124)	-100	
Float Pixel Data	(7FE0,0008)	(44 times) -150, -0.1356, 1.317, (28 times) -150, -0.986, 0.4402, -0.0251, 0.6077, 0.2982, 0.0872, 2.6927, 2.1434, -0.5543, -0.3014, -150 etc.	For convenience "," is used to separate the values, type is OF

Table XXXX-2.2. Example data for the Dimension Organization Module

Name	Tag	Value	Comment
Dimension Organization Sequence	(0020,9221)		
>Dimension Organization UID	(0020,9164)	1.2.3.5.6	Sample UID
Dimension Organization Type	(0020,9311)	3D	
Dimension Index Sequence	(0020,9222)	1	
Item 1	First Item describing Stack ID		
>Dimension Index Pointer	(0020,9165)	(0020,9056)	
>Functional Group Pointer	(0020,9167)	(0020,9111)	
>Dimension Organization UID	(0020,9164)	1.2.3.5.6	
>Dimension Description Label	(0020,9421)	Stack ID	
Item 2	Second Item describing In-Stack Position Number		
>Dimension Index Pointer	(0020,9165)	(0020,9057)	
>Functional Group Pointer	(0020,9167)	(0020,9111)	
>Dimension Organization UID	(0020,9164)	1.2.3.5.6	
>Dimension Description Label	(0020,9421)	In-Stack Position Number	

Table XXXX-2.3. Example data for the Pixel Measures Module

Name	Tag	Value	Comment
Pixel Measures Sequence	(0028,9110)	1	
>Pixel Spacing	(0028,0030)	3.75/3.75	
>Slice Thickness	(0018,0050)	5	

Table XXXX-2.4. Example data for the Frame Content Module

Name	Tag	Value	Comment
Frame Content Sequence	(0020,9111)		
>Frame Acquisition Number	(0020,9156)	1	
>Dimension Index Values	(0020,9157)	1/15	
>Stack ID	(0020,9056)	1	
>In-Stack Position Number	(0020,9057)	15	
>Frame Comments	(0020,9158)	…	
>Frame Label	(0020,9453)	…	

Table XXXX-2.5. Example data for the Identity Pixel Value Transformation Module

Name	Tag	Value	Comment
Pixel Value Transformation Sequence	(0028,9145)		Single item with fixed values
>Rescale Intercept	(0028,1052)	0	
>Rescale Slope	(0028,1053)	1	
>Rescale Type	(0028,1054)	US	

Table XXXX-2.6. Example data for the Frame VOI LUT With LUT Module

Name	Tag	Value	Comment
Frame VOI LUT Sequence	(0028,9132)		
>Window Center	(0028,1050)	0	
>Window Width	(0028,1051)	50	Covering -25 to 25

Table XXXX-2.7. Example data for the Real World Value Mapping Module

Name	Tag	Value	Comment
Real World Value Mapping Sequence	(0040,9096)		

Name	Tag	Value	Comment
>Double Float Real World Value First Value Mapped	(0040,9214)	-16.739	
>Double Float Real World Value Last Value Mapped	(0040,9213)	21.434	
>Real World Value Intercept	(0040,9224)	0	Identity transformation
>Real World Value Slope	(0040,9225)	1	Identity transformation
>Measurement Units Code Sequence	(0040,08EA)		
>>Include Table 8.8-1 "Code Sequence Macro Attributes"		(DCM, 113068, "Student's T-test")	
>Quantity Definition Sequence	(0040,9220)		Absent
>>Include Table 10-2 "Content Item Macro Attributes Description"			Absent

The Palette Color Lookup Table used is the SPRING Color Palette (See figure XXXX.1-3 Resulting Color LUT Spring).

This can be described as follows through the Palette Color Lookup Table:

Red has a constant value of 255

Green has a linear segment that starts at 0 and ends at 255

Blue has a linear segment that starts at 255 and ends at 0

Using the Segmented Color Lookup Table all three can be described by a discrete segment with length 1 to specify the starting value (0,1,value) followed by a linear segment of length 255 with the end-value (1,255,end-value).

Table XXXX-2.8. Example data for the Palette Color Lookup Table Module

Name	Tag	Value	Comment
Red Palette Color Lookup Table Descriptor	(0028,1101)	256/0/8	
Green Palette Color Lookup Table Descriptor	(0028,1102)	256/0/8	
Blue Palette Color Lookup Table Descriptor	(0028,1103)	256/0/8	
Segmented Red Palette Color Lookup Table Data	(0028,1221)	0,1,255,1,255,255	For convenience "," is used to separate the values, type is OW
Segmented Green Palette Color Lookup Table Data	(0028,1222)	0,1,0,1,255,255	For convenience "," is used to separate the values, type is OW
Segmented Blue Palette Color Lookup Table Data	(0028,1223)	0,1,255,1,255,0	For convenience "," is used to separate the values, type is OW

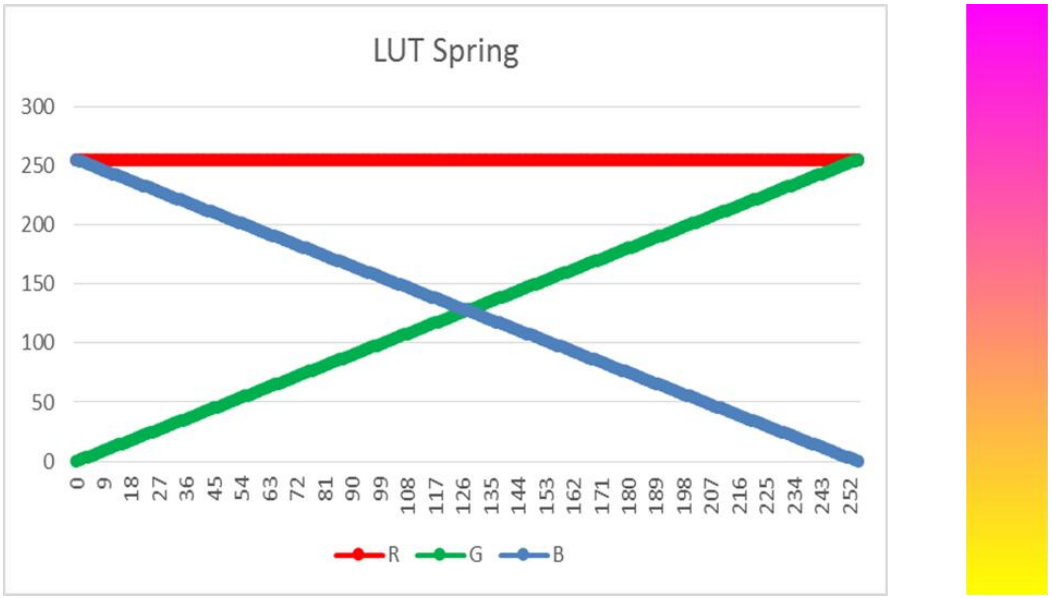

Figure XXXX.1-3 Resulting Color LUT Spring

The values specifying the range to be mapped to the Color LUT are given by the Minimum Stored Value Mapped and the Maximum Stored Value mapped.

Table XXXX-2.9. Example data for the Stored Value Color Range Module

Name	Tag	Value	Comment
Minimum Stored Value Mapped	(0028,xxx1)	-16.739	
Maximum Stored Value Mapped	(0028,xxx2)	21.434	

Table XXXX-2.10. Example data for the Parametric Map Frame Type Module

Name	Tag	Value	Comment
Parametric Map Frame Type Sequence	(0040,9092)		
>Frame Type	(0008,9007)	DERIVED/PRIMARY/FMRI/T_TEST	