AVW Reference Manual

Version 3.0

Biomedical Imaging Resource Mayo Foundation Rochester, Minnesota

Important Copyright Notice

All rights reserved. No part of this document may be reproduced in any form without written permission from the publisher. Collaborators and/or developers working with the Biomedical Imaging Resource who have a current license for **AVW** may make one additional copy of this document to be used exclusively in support of the collaboration.

©Copyright 1999 by Biomedical Imaging Resource, Mayo Foundation.

Staff of the Biomedical Imaging Resource, Mayo Foundation

Richard A. Robb, Ph.D., Director

Kurt Augustine

Darlene Bernard

Bruce Cameron

Jon Camp

Dennis Hanson

Ron Karwoski

Mark Korinek

Al Larson

Russ Moritz

Margret Ryan

Mahlon Stacy

Ellis Workman

Other Contributor

Dan Blezek

Armando Manduca

Advisor / Publisher

Richard A. Robb, Ph.D.

Table of Contents

Int	roduction	1
AVW	Functions	.20
AVW_	_AHEImage	. 20
AVW_	_AHEVolume	. 21
AVW_	_AddFPoint2	. 22
AVW_	_AddFPoint3	. 23
AVW_	_AddIPoint2	. 24
AVW_	_AddIPoint3	. 25
AVW_	_AddObject	. 26
_	_AddPoint2	
_	_AddPoint3	
_	_AddPointValue	
_	_AddTreeChild	
	_AnisotropicAffineImage	
	_AnisotropicDiffusionImage	
	_AnisotropicDiffusionImages	
_	_AnisotropicDiffusionVolumes	
_	_AutoTrace	
	_BestOpDataType	
	BlendImages	
_	BoundedStepSearchExtreme	
	BoundedStepSearchExtreme2D	
	_CalculateObjectRegions	
_	_Calloc	
	_ChamferDistanceImage	
_	_ChamferDistanceVolume	
_	_ChangeIsolatedPixels	
	_ClassifiedImageToCentroidFile	
_	_ClassifiedVolumeToCentroidFile	
	_ClassifyFromScattergram	
_	ClassifyImage	
	_ClassifyImageFromSampleFile	
	ClassifyScattergram	
_	ClassifyVolume	
	_ClassifyVolumeFromSampleFile	
	ClearHistogram	
_	ClipPointList2	
	_CloseImageFile	
	_ClosestInPointList2	
	_ClosestPointInImage	
	_Compute2DShapeStats	
	_ComputeCircularity	
	_ComputeDividedTrace	
	_ComputeFullWidthHalfMax	
	_ComputeImageCentroid	
	_ComputeImageFractalSig	
$AVW_{}$	_ComputeImageIntensityStats	. / ೮

AVW_	_ComputeLineProfile80
AVW_	_ComputeMEB81
AVW_	_ComputeMER82
AVW_	_ComputeObjectStats83
AVW_	_ComputePerimeter84
AVW	ComputeRFF85
_	ComputeThickLineProfile86
_	
	ComputeVolumeCentroid88
_	ComputeVolumeIntensityStats89
	ConditionalDilateGreyVolume91
	_ConditionalDilateImage93
	ConditionalDilateVolume94
	_ConnectAndDeleteImage95
	ConnectAndDeleteVolume96
_	_ConnectAndKeepImage98
	ConnectAndKeepVolume99
_	_ConstantOpImage
	ConstantOpVolume
_	_constantopvolume
	ConvertSurfaceToVolume
_	
_	_ConvertVolume
_	_ConvolveImage
_	_ConvolveVolume
	_CopyColormap110
	_CopyFPointList2111
	_CopyFPointList3112
	_CopyIPointList2113
_	_CopyIPointList3114
	_CopyImage115
	_CopyMatrix116
	_CopyObjectMap117
	_CopyPointList2118
	_CopyPointList3119
	_CopyPointValueList120
_	_CopyRenderedImage121
_	_CopyVolume
AVW_	_CorrelateImage123
AVW_	_CorrelateVolume124
AVW_	_Counter125
AVW_	_CounterFunction126
AVW_	_CreateButterworthCoeffs127
AVW_	_CreateCircularMTF128
AVW_	_CreateCoeffs129
AVW_	_CreateColormap
AVW_	_CreateCompositeInfo131
AVW_	_CreateFPointList2132
	- _CreateFPointList3133
_	- _CreateGaussianCoeffs134
	- _CreateHistogram
_	
	CreateImageFile 139

	_CreateList	
_	_CreateMatrix	
	_CreateObjectMap	
	_CreatePointList2	
_	_CreatePointList3	
_	_CreatePointValueList	
_	_CreateSphericalMTF	
_	_CreateStoksethMTF	
_	_CreateStructuringImage	
_	_CreateStructuringVolume	
_	_CreateTree	
_	_CreateVolume	
	_CropImage	
_	_CubeSections	
_	_CubicSplineInterpolatedPixel	
_	_CubicSplineInterpolatedVoxel	
_	_DataTypeToBands	
_	_DataTypeToBytes	
_	_DecompressWaveletBuffer	
_	_DeconvDivideImage	
_	_DeconvDivideVolume	
_	_DeconvWienerImage	
_	_DeconvWienerVolume	
_	_DefineConnected	
_	_DefineUnconnected	
_	_DeleteObject DestroyCoeffs	
_	_DestroyCoeffs DestroyColormap	
_	_DestroyColormap DestroyCompositeInfo	
_	_DestroyCompositeinio DestroyContourSurface	
_	_DestroyContourSurface DestroyFPointList2	
_	DestroyFPointList3	
_	DestroyGradients	
_	DestroyHistogram	
_	DestroyIPointList2	
	DestroyIPointList3	
_	DestroyImage	
	_DestroyInstructions	
	DestroyList	
_	DestroyMatchVoxelParams	
_	_bestroyMatrix	
	_DestroyMergedMap	
	_DestroyMultiList2	
	_DestroyObjectMap	
	_DestroyPointList2	
	DestroyPointList3	
_	DestroyPointValueList	
_	_DestroyRPParam	
	_bestroyRenderParameters	
	_DestroyRenderedImage	
	_DestroyTileParameters	
	DestroyTiledSurface	
_	_bestroyTree	
	DestrovVisibleSurface	

	_	
_	_DestroyVolume2	
	_DilateImage2	
_	_DilateVolume	
_	_DisableImageFileFormat2	
_	_DisableProgress2	
_	_DitherImage2	
_	_DitherVolume	
_	_DoInstructions2	
_	_DrawFilledPointList22	
_	_DrawImageLine	
	_DrawImageText2	
	_DrawPointList22	
	_DrawPointList32	
_	_DrawRenderedBackDrop2	
	_DrawRenderedLine2	
	_DrawRenderedPoint2	
	_DrawVolumeLine2	
	_EditPointList22	
_	_EnableImageFileFormat2	
_	_EnableProgress2	
_	_ErodeImage2	
AVW_	_ErodeVolume2	22
_	_Error2	
_	_ExtendExternalLibs2	
	_ExtendImageFile2	
AVW_	_ExtractControlPoints2	29
AVW_	_ExtractGradients2	30
AVW_	_ExtractObject	31
AVW_	_ExtractVisibleSurface2	32
AVW_	_FFT2D	33
AVW	_ _FFT3D2	34
AVW	- FillHolesImage2	35
AVW	FillHolesVolume	36
AVW		37
_	- FillPointList32	
_	_ _FindImageComponents2	
	FindImageEdges	
	FindRenderedPoint	
_	FindRotation	
_	FindSurfaceArea2	
_	FindSurfaceDistance	
_	FindSurfacePoints	
_	FindTraceCenter	
_	FindTreeIndex	
_	FindTreeStart	
_	_FindTreeStart	
	_FindVolumeEdges	
	_FindVolumeHages	
_	_FindVolumeMaxMin	
_		
	_FlattenImageHistogram2	
_	_FlattenVolumeHistogram2	
	_FlipImage2	
AVW	FlipVolume	59

AVW_	_FormatSupports	260
AVW_	_Free	261
AVW_	_FunctionImage	262
AVW		264
AVW	_ _GetBoundaryAndDelete	266
AVW		267
	GetCurved	
_	- _GetErrorMessage	
	 _GetErrorNumber	
	- GetFPoint2	
_	GetFPoint3	
_	GetHistogramMedianValue	
_	GetHistogramModeValue	
	GetIPoint2	
_	GetIPoint3	
_	_GetImageChannel	
	_GetImageHistogram	
	_GetImageIntensities	
	GetLiklihoods	
_	_GetMaskBoundary	
	GetMaskedImage	
_	GetMaskedVolume	
_	GetNumericInfo	
_	GetObject	
_	GetOblique	
_	_GetOrthogonal	
	_GetOutsideEdges	
	GetPixel	
_	GetPoint2	
_	GetPoint3	
_	GetPointValue	
_	_GetScatLiklihoods	
	GetStringInfo	
_	_GetStringinio _GetSubImage	
	_GetSubImageWithIncrements	
	GetSubVolumeGetSubVolume	
_	GetThresholdedBoundary	
_	_GetVolumeChannel	
	_GetVolumeChannel	
	_GetVorel	
	_GetVoxe1	
	_HomotopicThickenVolume	
	_ImageOpImage	
	_ImageSampleEntropy	
_	- 5 1	
	_ImageSampleNMI	
_	_InhomogeneityCorrectVolume	
	_InitializeMatchVoxelParams	
	_InitializeRPParam	
	_InitializeRenderParameters	
_	_InitializeTileParameters	
_	_InsertFPoint2	.325 .326
Δ \ / \ \ / \ \ /	INCATERUAINE	イノ ん

_	_InsertIPoint2	
_	_InsertIPoint3	
	_InsertPoint2	
	_InsertPoint3	
	_InsertPointValue	
_	_IntensityClipImage	
_	_IntensityClipVolume	
_	_IntensityScaleImage	
_	_IntensityScaleVolume	
_	_InterpolatedPixel	
_	_InterpolatedVoxel	
_	_IntersectingSections	
_	_InvertImage	
_	_InvertMatrix	
_	_InvertVolume	
_	_IsASubsetImage	
	_IsGrayColormap	
_	_IsImageZero	
_	_IsVolumeZero	
_	_IterDeconvImage	
_	_IterDeconvVolume	
_	_LabelImageFromEdges	
_	_LabelVolumeFromEdges	
_	_ListFormats	
_	ListInfo	
_	_LoadColormap	
_	_LoadCompositeInfo	
_	_LoadContourSurface	
_	_LoadObjectMap	
_	_LoadTiledSurface	
_	_LoadTree	
_	_LowpassFilterImage	
_	_LowpassFilterVolume	
_	_MMapSelect	
_	_MMapVolume	
_	_MakeColorImage	
	_MakeColorVolume	
	_MakeComplexImageViewable	
_	_MakeFPointList2	
_	_MakeGrayImage	
_	_MakeGrayVolume	
_	_MakeMaskFromTrace	
_	_MakeMatrixFrom3Points	
_	_MakeMatrixFromAxis	
	_MakeMonoImage	
	_MakeSpline	
_	_MakeTree	
_	_MakeVolumeFromImage	
_	_Malloc	
_	_MaskImageToSampleFile	
	_MaskVolumeToSampleFile	
	_MatchImageHistogram	
_	_MatchSurfaces	
WVA	MatchVolumeHistogram	. 384

AVW_	_MatchVoxels385
AVW_	_MatrixAngles
AVW_	_MaximumDataValue
AVW_	_MedialAxisTransformVolume388
AVW	
AVW	MedianFilterVolume390
_	- MergeInfo
_	MergeRendered392
_	MinimumDataValue
_	MirrorMatrix394
_	MirrorRendered395
_	_MorphCloseImage396
	MorphCloseVolume397
_	_MorphMaxImage398
	MorphMaxVolume
_	_MorphMinImage400
	MorphMinVolume400
_	
	_MorphOpenImage402
_	_MorphOpenVolume403
_	_MultiplyMatrix404
_	_NearestNeighborDeconv405
_	_NearestNeighborPixel407
	_NearestNeighborVoxel408
_	_NonMaxImage
_	_NonMaxVolume410
_	_NormalizeHistogram411
	_ObjectScaleImage412
_	_ObjectSeparator414
_	_OpenImageFile415
AVW_	_OpenImageFileList417
AVW_	_OrthoGradFilterImage419
AVW_	_OrthoGradFilterVolume420
AVW_	_PCAImages421
AVW_	_PCAVolumes422
AVW_	_PadImage423
AVW	PadVolume
AVW	- Parse
_	- _PreserveImageHistogram426
	ProcessRenderWedge428
_	ProcessZGradients429
	Progress
_	ProgressFunction431
	_PruneVolume
	_PutHistoryInfo433
	_PutImageChannel434
	_PutMaskedImage435
	_PutMaskedUnage435
	_PutMultipleObjects436
	_PutNumericInfo
	_PutObject440
	_PutOblique441
	_PutOrthogonal
$\Delta V/M$	

	$ \cdot$ $ \cdot$ $ \cdot$ $ \cdot$	
	_PutStringInfo	
	_PutSubImage	
_	_PutSubVolume	
_	_PutVolumeChannel	
	_PutVoxel	
	_QuadSwapImage	
_	_QuickImageMaxMin	
	_QuickMatch	
_	_QuickVolumeMaxMin	
	_RankFilterImage	
_	_RankFilterVolume	
	_ReadHistogram	
	_ReadImageFile	
AVW_	_ReadVolume	458
AVW_	_Realloc	459
AVW_	_ReassignObject	460
AVW_	_ReduceColors	461
AVW_	_RegenerateObjectMap	462
AVW_	_RegisterProgramName	463
AVW_	_RemoveFPoint2	464
AVW_	_RemoveFPoint3	465
AVW_	_RemoveIPoint2	466
AVW_	_RemoveIPoint3	467
AVW_	_RemoveInfo	468
AVW_	_RemovePoint2	469
AVW_	_RemovePoint3	470
AVW_	_RemovePointValue	471
AVW_	_RemoveUnrenderable	472
AVW_	_RemoveUnusedObjects	473
_	_RenderGradients	
AVW_	_RenderOblique	475
AVW_	_RenderSections	476
AVW_	_RenderVisibleSurface	477
AVW_	_RenderVolume	478
AVW_	_RenderableVolume	484
AVW_	_ResetIntensityStats	485
AVW_	_ResizeImage	486
AVW_	_ResizeSubImage	488
AVW_	_ResizeSubVolume	489
AVW_	_ResizeVolume	490
AVW_	_ResizeVolumeSliceBySlice	492
AVW_	_ResizeVolumeUsingShapeInt	494
AVW_	_ReverseBits	495
AVW_	_Rotate90Image	496
AVW_	_RotateMatrix	497
AVW_	_RotatePointList2	498
AVW	_ _RoundImage	499
AVW		500
AVW	_ _SaveColormap	501
AVW_		503
AVW_		504
AVW		505
Z\ 7.77\7	- SaveTrae	506

AVW_	_ScaleMatrix	507
AVW_	_ScalePointList2	508
AVW_	_Scattergram	509
AVW_	_ScattergramFromImages	510
AVW_	_ScattergramFromVolumes	511
AVW_	_SeekImageFile	512
AVW	 SetError	513
AVW	- SetIdentityMatrix	514
_	- _SetImage	
	SetVolume	
_		
	_SetupVolumeSample	
	_ShiftImage	
	ShiftPointList2	
_	ShowImage	
_	_SigmaFilterImage	
	_SigmaFilterVolume	
	SincInterpolatedPixel	
_	_SincInterpolatedVoxel	
	SincWindowLimit	
_	SliceVolume	
_	_SIICeVOIUME _SmoothHistogram	
	_SmoothfistogramSobelFilterEnhanceImage	
_	_SobelFilterEnhanceImage	
	_SobelFilterEnnancevolume _SobelFilterImage	
_	_SobelFilterVolume	
	_StepSearchExtreme	
_	_StepSearchExtreme2D	
	_SumIntensityStats	
_	_SwapBlock	
_	_SwapDouble	
_	_SwapFloat	
	_SwapImage	
	_SwapInt	
	_SwapLong	
_	_SwapShort	
	_TableImage	
AVW_	_TableVolume	546
_	_Thin2D	
_	_Thin3D	
AVW_	_ThresholdImage	549
AVW_	_ThresholdVolume	550
AVW_	_TileVolume	551
AVW_	_TransformFPoint2	552
AVW_	_TransformFPoint3	553
AVW_	_TransformFPointList2	554
AVW		555
AVW	_ _TransformIPoint2	556
AVW	- _TransformIPoint3	557
AVW	- _TransformIPointList2	558
_	- _TransformIPointList3	
_	_ _TransformImage	
_	TransformPoint2	
	TransformDoint3	562

AVW TransformPointList2	.563
AVW TransformPointList3	
AVW TransformVolume	.565
AVW_TransformVolumeSliceBySlice	.566
AVW_TranslateMatrix	.567
AVW TranslatePointList2	
AVW TreeAnalysis	.569
AVW_UltimateErosionImage	
AVW_UltimateErosionVolume	
AVW_UnsharpFilterEnhanceImage	
AVW_UnsharpFilterEnhanceVolume	
AVW_UnsharpFilterImage	
AVW_UnsharpFilterVolume	
AVW_UnsuperClassifyImage	
AVW_UnsuperClassifyVolume	
AVW_UpdateConfidenceClasses	
AVW_UpdateImageClassification	
AVW_UpdateImageMask	
AVW_UpdateVolumeMask	
AVW_VSFMeanFilterVolume	
AVW_ValidationErrorHandler	
AVW_VerifyDataType	
AVW_VerifyHistogram	
AVW_VerifyImage	
AVW_VerifyVolume	
AVW_VolumeOpConstant	
AVW_VolumeOpVolume	
AVW_VolumeSampleEntropy	
AVW_VolumeSampleJointEntropy	
AVW VolumeSampleNMI	
AVW_WaveletCompressAndDecompressImage	
AVW_WaveletCompressImage	
AVW_WaveletCompressImageFile	
AVW_WireGrid	
AVW_WriteHistogram	
AVW WriteImageFile	
AVW_WriteSubVolumeDescription	
AVW WriteVolume	
EXTEND.conf	
AVW Structures	
AVW_2DShapeStats	
AVW_Colormap	
AVW_Complex	
AVW_CompositeInfo	
AVW_compositering.	
AVW_ExtendIO	
AVW_FPoint2	
AVW_FPOINt2AVW FPoint3	
AVW_FPOINTSAVW FPointList2	
AVW_FPOINTLIST2	
AVW_FPOINTLISTS	
AVW_FilterCoeffs	
AVW_rullWlutlmallMax	
AVW Gradients	
DVW 111 (AVAILABLE	

	1 .	
	_Histogram	
_	_IPoint2	
_	_IPoint3	
_	_IPointList2	
	_IPointList3	
	_Image	
_	_ImageFile	
_	_Instructions	
_	_IntensityStats	
	_Line2	
_	_Line3	
_	_List	
_	_MatchParameters	
_	_MatchResult	
_	_MatchVoxelParams	
_	_Matrix	
_	_MergedMap	
AVW_	_MultiList2	647
AVW_	_Object	648
AVW_	_ObjectMap	650
AVW_	_Point2	651
AVW_	_Point3	652
AVW_	_PointList2	653
AVW_	_PointList3	654
AVW_	_PointValueList	655
AVW_	_RPParam	656
AVW_	_Rect2	658
AVW_	_Rect3	659
AVW	_ _RenderParameters	660
AVW	_ _RenderedImage	663
AVW		665
	 _StepSearchSpec	
	TileParameters	
_	- TiledSurface	
_	- Tree	
_	TreePoint	
_	- VisibleSurface	
_		
	Volume	
_	Macros	
	DESTROYCOEFFS	
_	DESTROYCOLORMAP	
_	DESTROYCOMPOSITEINFO	
_	DESTROYFPOINTLIST2	
_	DESTROYFPOINTLIST2 DESTROYFPOINTLIST3	
_	DESTROYFPOINTLISI3 DESTROYHISTOGRAM	
_	DESTROYHISIOGRAM	
_		
_	_DESTROYIPOINTLIST2	
_	_DESTROYIPOINTLIST3	
	_DESTROYLIST	
	_DESTROYPOINTLIST2	
_	_DESTROYPOINTLIST3	
_	_DESTROYPOINTVALUELIST	
A V W	DESTROYRENDEREDIMAGE	689

AVW_	DESTROYRENDERPARAMETERS	690
AVW_	_DESTROYVOLUME	691
AVW_	_GETBLUE	692
AVW_	_GETGREEN	693
AVW_	_GETRED	694
AVW_	MAKERGB	695
AVW_	_READSWAP	696
WVA	WRITESWAP.	697