100 Useful Classes

The VTK Class List provides an annotated list of all VTK classes.This can be accessed at:

http://noodle.med.yale.edu/vtk/annotated.html.In this section,I highlight some of these classes:

1.vtkActorCollection:List of actors.This can be useful for storing groups of actors to show/hide together.

2.vtkAppendPolyData:Appends one or more polygonal datasets together.This is extremely useful for

forming complex objects consisting of many polygonal pieces.It is often preferable to combine the objects

at this level as opposed to have multiple actors.

3.vtkApproximatingSubdivisionFilter:Generate a subdivision surface using an Approximating Scheme.

4.vtkAssembly:Create hierarchies of vtkProp3Ds(transformable props).This can be used to combine multiple actors into a single one.

5.vtkCallbackCommand:Supports function callbacks.This is exceedingly useful in large programs.

6.vtkCamera:Virtual camera for 3D rendering.This is used by all vtkRenderer classes.

7.vtkCell:Abstract class to specify cell behavior–this is worth looking at if you are interested in finite

element meshes and arbitrary topologies.

8.vtkCellArray:Object to represent cell connectivity

9.vtkCleanPolyData:Merge duplicate points,and/or remove unused points and/or remove degenerate cells.

This is very useful for downsampling a surface to generate a set of points to use as an input to a point-based registration method.It does“destroy”the surface structure.

10.vtkCollection:Create and manipulate unsorted lists of objects.This is very useful in large programs,for grouping a set of objects together.

11.vtkConnectivityFilter:Extract data based on geometric connectivity.

12.vtkContourFilter:Generate isosurfaces/isolines from scalar values.This can be used to extract,for example,zero-levelsets from a level set propagation algorithm.

13.vtkCurvatures:Compute curvatures(Gauss and mean)of a Polydata object.

14.vtkDataArray:Abstract superclass for arrays.This is the parent class for all data arrays and it is worth

being familar with it’s structure.

15.vtkDataObject:General representation of visualization data

16.vtkDataSet:Abstract class to specify dataset behavior

17.vtkDecimate:Reduce the number of triangles in a mesh

18.vtkDICOMImageReader:Reads DICOM images.This is not a complete implementation but useful nonetheless.

19.vtkExtractVOI:Select piece(e.g.,volume of interest)and/or subsample structured points dataset

20.vtkGaussianSplatter:Splat points into a volume with an elliptical,Gaussian distribution

21.vtkGeneralTransform:Allows operations on any transforms.This is very useful for concatenating transfor-mations of di?erent types into a single transformation.Note that for proper operationg the“PostMultiply”

flag needs to be set.

22.vtkGeometryFilter:Extract geometry from data(or convert data to polygonal type)

23.vtkGridTransform:Nonlinear warp transformation.This stores a transformation as a displacement field

(with either linear or cubic interpolation).

24.vtkHeap:Replacement for malloc/free and new/delete

25.vtkHull:Produce an n-sided convex hull

26.vtkIdentityTransform:Transform that doesn’t do anything.This may sound useless,but if you have to

have a transformation somewhere that is identity,this is the fastest way to do it!

27.vtkIdList:List of point or cell ids

28.vtkIdListCollection:Maintain an unordered list of dataarray objects.This can be useful for getting a list

of unique indices for example.

29.vtkImageAccumulate:Generalized histograms up to 4 dimensions.

30.vtkImageAnisotropicDi?usion3D:Edge preserving smoothing.This is worth looking at.

31.vtkImageAppend:Collects data from multiple inputs into one image.The AppendAxis is used to define

the direction of“stiching”.

32.vtkImageAppendComponents:Collects components from two inputs into one output.

33.vtkImageBlend:Blend images together using alpha or opacity.

34.vtkImageCast:Image Data type Casting Filter

35.vtkImageConvolve:Convolution of an image with a kernel

36.vtkImageCorrelation:Correlation imageof the two inputs

37.vtkImageData:Topologically and geometrically regular array of data

38.vtkImageExport:Export VTK images to third-party systems.This basically gets you a raw pointer that you can use to access the data.

39.vtkImageExtractComponents:Outputs a single component

40.vtkImageFFT:Fast Fourier Transform

41.vtkImageFlip:This flips an axis of an image.Right becomes left..

42.vtkImageGaussianSmooth:Performs a gaussian convolution

43.vtkImageGradient:Computes the gradient vector

44.vtkImageGradientMagnitude:Computes magnitude of the gradient

45.vtkImageImport:Import data from a C array.This is useful for integrating with legacy code.

46.vtkImageLaplacian:Computes divergence of gradient

47.vtkImageMagnitude:Colapses components with magnitude function.

48.vtkImageMarchingCubes:Generate isosurface(s)from volume/images

49.vtkImageMask:Combines a mask and an image

50.vtkImageMathematics:Add,subtract,multiply,divide,invert,sin,cos,exp,log

51.vtkImageMedian3D:Median Filter

52.vtkImageNonMaximumSuppression:Performs non-maximum suppression.This is part of the implemen-

tation of the Canny edge detection filter.

53.vtkImageRFFT:Reverse Fast Fourier Transform

54.vtkImageSeedConnectivity:SeedConnectivity with user defined seeds

55.vtkImageSeparableConvolution:3 1D convolutions on an image

56.vtkImageShiftScale:Shift and scale an input image.This also allows for changing the image type from

e.g.short to float.

57.vtkLabeledDataMapper:Draw text labels at dataset points.This is useful for automatically numbering

points.

58.vtkLandmarkTransform:Linear transform specified by two corresponding point sets

59.vtkLookupTable:Map scalar values into colors via a lookup table

60.vtkMarchingContourFilter:Generate isosurfaces/isolines from scalar values

61.vtkMarchingCubes:Generate isosurface(s)from volume

62.vtkMath:Performs common math operations.This is a good example of integrating procedural code into VTK.All member methods of this class are static.Pi is also defined here in a cross-platform manner.

63.vtkMatrix4x4:Represent and manipulate 4x4 transformation matrices

64.vtkOutlineFilter:Create wireframe outline for arbitrary data set

65.vtkPCAAnalysisFilter:Performs principal component analysis of a set of aligned pointsets

66.vtkPlane:Perform various plane computations

67.vtkPlaneSource:Create an array of quadrilaterals located in a plane

68.vtkPNMReader:Read pnm(i.e.,portable anymap)files

69.vtkPNMWriter:Writes PNM(portable any map)files

70.vtkPoints:Represent and manipulate 3D points

71.vtkPolyData:Concrete dataset represents vertices,lines,polygons,and triangle strips

72.vtkPolyDataConnectivityFilter:Extract polygonal data based on geometric connectivity

73.vtkPolyDataMapper:Map vtkPolyData to graphics primitives

74.vtkPolyDataNormals:Compute normals for polygonal mesh

75.vtkPolyDataReader:Read vtk polygonal data file

76.vtkPolyDataWriter:Write vtk polygonal data

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77.vtkPostScriptWriter:Writes an image as a PostScript file

78.vtkPriorityQueue:List of ids arranged in priority order

79.vtkProbeFilter:Sample data values at specified point locations.This is extremely useful for sampling im-

ages at arbitrary locations,e.g.computing line integrals using surfaces and or curves for the implementation

of deformable model segmentation.

80.vtkProcrustesAlignmentFilter:Aligns a set of pointsets together

81.vtkRenderer:Abstract specification for renderers

82.vtkRenderWindow:Create a window for renderers to draw into

83.vtkScalarBarActor:Create a scalar bar with labels

84.vtkTextActor:An actor that displays text.Scaled or unscaled

85.vtkTextMapper:2D text annotation

86.vtkTexture:Handles properties associated with a texture map

87.vtkThinPlateSplineTransform:Nonlinear warp transformation.This is used in many non-rigid registration applications.

88.vtkTkImageViewerWidget:Tk Widget for viewing vtk images

89.vtkTkRenderWidget:Tk Widget for vtk renderering

90.vtkTransform:Describes linear transformations via a 4x4 matrix

91.vtkTransformFilter:Transform points and associated normals and vectors

92.vtkTransformPolyDataFilter:Transform points and associated normals and vectors for polygonal dataset

93.vtkTriangleFilter:Create triangle polygons from input polygons and triangle strips

94.vtkUnstructuredGrid:Dataset represents arbitrary combinations of all possible cell types.This is useful

for representing meshes.

95.vtkVolume:Volume(data&properties)in a rendered scene

96.vtkVolumeRayCastCompositeFunction:Ray function for compositing

97.vtkVolumeRayCastMapper:A slow but accurate mapper for rendering volumes

98.vtkVolumeTextureMapper2D:Abstract class for a volume mapper

99.vtkVRMLExporter:Export a scene into VRML 2.0 format

100.vtkWindowLevelLookupTable:Map scalar values into colors or colors to scalars;generate color table