

Module Interface Specification for Aorta

Jingyi Lin

September 24, 2022

1 Revision History

Date	Version	Notes
Date 1	1.0	Notes
Date 2	1.1	Notes

2 Symbols, Abbreviations and Acronyms

See SRS Documentation at [\[give url —SS\]](#)

[\[Also add any additional symbols, abbreviations or acronyms —SS\]](#)

Contents

1	Revision History	i
2	Symbols, Abbreviations and Acronyms	ii
3	Introduction	1
4	Notation	1
5	Module Decomposition	1
6	MIS of AortaSegmenter	3
6.1	Module	3
6.2	Uses	3
6.3	Syntax	3
6.3.1	Exported Constants	3
6.3.2	Exported Access Programs	3
6.4	Semantics	3
6.4.1	State Variables	3
6.4.2	Environment Variables	3
6.4.3	Assumptions	3
6.4.4	Access Routine Semantics	4
6.4.5	Local Functions	4
7	Appendix	6

3 Introduction

The following document details the Module Interface Specifications for Aorta GeomRecon software. This software aims to provide Aorta 3D geometry reconstruction by processing .dicom files (CT scans), it provides a user-friendly user interface where users can select the region to segment out Aorta from other parts of the organs.

Complementary documents include the System Requirement Specifications and Module Guide. The full documentation and implementation can be found at ... [\[provide the url for your repo —SS\]](#)

4 Notation

[\[You should describe your notation. You can use what is below as a starting point. —SS\]](#)

The structure of the MIS for modules comes from [Hoffman and Strooper \(1995\)](#), with the addition that template modules have been adapted from [Ghezzi et al. \(2003\)](#). The mathematical notation comes from Chapter 3 of [Hoffman and Strooper \(1995\)](#). For instance, the symbol $:=$ is used for a multiple assignment statement and conditional rules follow the form $(c_1 \Rightarrow r_1 | c_2 \Rightarrow r_2 | \dots | c_n \Rightarrow r_n)$.

The following table summarizes the primitive data types used by Aorta.

Data Type	Notation	Description
character	char	a single symbol or digit
integer	\mathbb{Z}	a number without a fractional component in $(-\infty, \infty)$
natural number	\mathbb{N}	a number without a fractional component in $[1, \infty)$
real	\mathbb{R}	any number in $(-\infty, \infty)$

The specification of Aorta uses some derived data types: sequences, strings, and tuples. Sequences are lists filled with elements of the same data type. Strings are sequences of characters. Tuples contain a list of values, potentially of different types. In addition, Aorta uses functions, which are defined by the data types of their inputs and outputs. Local functions are described by giving their type signature followed by their specification.

5 Module Decomposition

The following table is taken directly from the Module Guide document for this project.

Level 1	Level 2
Hardware-Hiding	
Behaviour-Hiding	Input Parameters Output Format Output Verification Temperature ODEs Energy Equations Control Module Specification Parameters Module
Software Decision	Sequence Data Structure ODE Solver Plotting

Table 1: Module Hierarchy

6 MIS of AortaSegmenter

Label - AS

6.1 Module

- **Type** Abstract Object

6.2 Uses

- **SITK** Open source interface to the Insight Segmentation and Registration Toolkit (ITK).

6.3 Syntax

6.3.1 Exported Constants

6.3.2 Exported Access Programs

Name	In	Out	Exceptions
[accessProg —SS]	-	-	-

6.4 Semantics

6.4.1 State Variables

segmentation_factor: real

segmenting_image: SITK.image

segmenting_image_255: SITK.image

6.4.2 Environment Variables

[\[This section is not necessary for all modules. Its purpose is to capture when the module has external interaction with the environment, such as for a device driver, screen interface, keyboard, file, etc. —SS\]](#)

6.4.3 Assumptions

[\[Try to minimize assumptions and anticipate programmer errors via exceptions, but for practical purposes assumptions are sometimes appropriate. —SS\]](#)

6.4.4 Access Routine Semantics

[accessProg —SS]():

- transition: [if appropriate —SS]
- output: [if appropriate —SS]
- exception: [if appropriate —SS]

[A module without environment variables or state variables is unlikely to have a state transition. In this case a state transition can only occur if the module is changing the state of another module. —SS]

[Modules rarely have both a transition and an output. In most cases you will have one or the other. —SS]

6.4.5 Local Functions

[As appropriate —SS] [These functions are for the purpose of specification. They are not necessarily something that is going to be implemented explicitly. Even if they are implemented, they are not exported; they only have local scope. —SS]

References

- Carlo Ghezzi, Mehdi Jazayeri, and Dino Mandrioli. *Fundamentals of Software Engineering*. Prentice Hall, Upper Saddle River, NJ, USA, 2nd edition, 2003.
- Daniel M. Hoffman and Paul A. Strooper. *Software Design, Automated Testing, and Maintenance: A Practical Approach*. International Thomson Computer Press, New York, NY, USA, 1995. URL <http://citeseer.ist.psu.edu/428727.html>.

7 Appendix

[Extra information if required —SS]