Module Interface Specification for OCRacle

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1   Revision History

Date	Version	Notes
March 13, 2025	1.0	Initial Document Creation

2 Symbols, Abbreviations and Acronyms

See SRS Documentation at https://github.com/ptrandev/OCRacle/blob/main/docs/SRS/SRS.pdf for symbols, abbreviations and acronyms.

Contents

3 Introduction

The following document details the Module Interface Specifications for OCRacle, an optical character recognition (OCR) program for identifying Latin alphabet characters.

Complementary documents include the System Requirement Specifications and Module Guide. The full documentation and implementation can be found at https://github.com/ptrandev/OCRacle/.

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 $(c_1 \Rightarrow r_1 | c_2 \Rightarrow r_2 | ... | c_n \Rightarrow r_n)$.

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

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

The specification of OCRacle 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, OCRacle 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 Format Module
	Model Output Module
	Model Training Module
	Model Testing Module
	Prediction Model Module
	Application Module
	OAR Performance Metrics Module
Software Decision	Image Preprocessing Module
	Performance Metrics Module
	Graphical User Interface Module

Table 1: Module Hierarchy

6 MIS of Application Module

6.1 Module

[Short name for the module —SS]

6.2 Uses

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

[Not all modules will have state variables. State variables give the module a memory. —SS]

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]

7 MIS of Input Format Module

7.1 Module

[Short name for the module —SS]

7.2 Uses

7.3 Syntax

7.3.1 Exported Constants

7.3.2 Exported Access Programs

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

7.4 Semantics

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8 MIS of Input Format Module

8.1 Module

[Short name for the module —SS]

8.2 Uses

8.3 Syntax

8.3.1 Exported Constants

8.3.2 Exported Access Programs

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

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9 MIS of Model Output Format Module

9.1 Module

[Short name for the module —SS]

9.2 Uses

9.3 Syntax

9.3.1 Exported Constants

9.3.2 Exported Access Programs

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

9.4 Semantics

9.4.1 State Variables

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10 MIS of Model Training Module

10.1 Module

[Short name for the module —SS]

10.2 Uses

10.3 Syntax

10.3.1 Exported Constants

10.3.2 Exported Access Programs

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

10.4 Semantics

10.4.1 State Variables

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11   MIS of Model Testing Module

11.1   Module

[Short name for the module —SS]

11.2   Uses

11.3   Syntax

11.3.1   Exported Constants

11.3.2   Exported Access Programs

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

11.4   Semantics

11.4.1   State Variables

[Not all modules will have state variables. State variables give the module a memory. —SS]

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12 MIS of Prediction Model Module

12.1 Module

[Short name for the module —SS]

12.2 Uses

12.3 Syntax

12.3.1 Exported Constants

12.3.2 Exported Access Programs

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

12.4   Semantics

12.4.1   State Variables

[Not all modules will have state variables. State variables give the module a memory. —SS]

12.4.2   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]

12.4.3   Assumptions

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12.4.4   Access Routine Semantics

[accessProg —SS]():

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13   MIS of Image Preprocessing Module

13.1   Module

[Short name for the module —SS]

13.2 Uses

13.3 Syntax

13.3.1 Exported Constants

13.3.2 Exported Access Programs

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

13.4 Semantics

13.4.1 State Variables

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13.4.2 Environment Variables

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14 MIS of Performance Metrics Module

14.1 Module

[Short name for the module —SS]

14.2 Uses

14.3 Syntax

14.3.1 Exported Constants

14.3.2 Exported Access Programs

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

14.4 Semantics

14.4.1 State Variables

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15 MIS of Graphical User Interface Module

15.1 Module

[Short name for the module —SS]

15.2 Uses

15.3 Syntax

15.3.1 Exported Constants

15.3.2 Exported Access Programs

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

15.4 Semantics

15.4.1 State Variables

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15.4.2 Environment Variables

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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.

16 Appendix

[Extra information if required —SS]