Multistage Programming with Dependent Type*

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要旨の全体的に、動機付けが弱いかな。。。
あと研究の技術的なポイントがわかるとよいですね。

Abstract. We develop yet another typed multi-stage calculus λ^{MD}. It extends Hanada and Igarashi's $\lambda^{\triangleright\%}$ with dependent type.
Multi-stage calculus enables us to generate and execute codes at runtime. And people have researched a method for improving the performance of programs. On the other hand, the dependent type is a type depending on values. It is famous for its application for vectors with their length.
In this article, we design λ^{MD} by introducing dependent type into Lamda-TP. It has a simple, substitution-based full-reduction semantics and enjoys basic properties of subject reduction, confluence, and strong normalization. In addition, we define an evaluation context which takes stages into account. Under the evaluation context progress is hold.
As a result of the combination of multi-stage calculus and dependent type, we can test code-generating functions such as staged interpreter at type-checking time. Staged-interpreter takes an abstract syntax tree as its input and output a corresponding code. Using dependent type, we can check whether some conditions written as a term is true or not at type-checking time. Then we can check staged-interpreter returns the correct output for a given input.
Finally, we discuss the relationship between Cross Stage ~~Persistent~~ and decidability of type checking. If you import dependent type to multi-stage calculus naively, the type checking may fail into an infinite loop and doesn't finish forever. We impose a little restriction on typing rules and made the type checking finish in finite time.
238 words
The abstract should briefly summarize the contents of the paper in 150–250 words.

Keywords: Multistage programming · Dependent type · Specification verification by tests.

1 First Section

1.1 A Subsection Sample

Please note that the first paragraph of a section or subsection is not indented. The first paragraph that follows a table, figure, equation etc. does not need an indent, either.

Subsequent paragraphs, however, are indented.

* Supported by organization x.

Sample Heading (Third Level) Only two levels of headings should be numbered. Lower level headings remain unnumbered; they are formatted as run-in headings.

Sample Heading (Fourth Level) The contribution should contain no more than four levels of headings. Table 1 gives a summary of all heading levels.

Table 1. Table captions should be placed above the tables.

Heading level	Example	Font size and style
Title (centered)	**Lecture Notes**	14 point, bold
1st-level heading	**1 Introduction**	12 point, bold
2nd-level heading	**2.1 Printing Area**	10 point, bold
3rd-level heading	**Run-in Heading in Bold.** Text follows	10 point, bold
4th-level heading	*Lowest Level Heading.* Text follows	10 point, italic

Displayed equations are centered and set on a separate line.

$$x + y = z \tag{1}$$

Please try to avoid rasterized images for line-art diagrams and schemas. Whenever possible, use vector graphics instead (see Fig. 1).

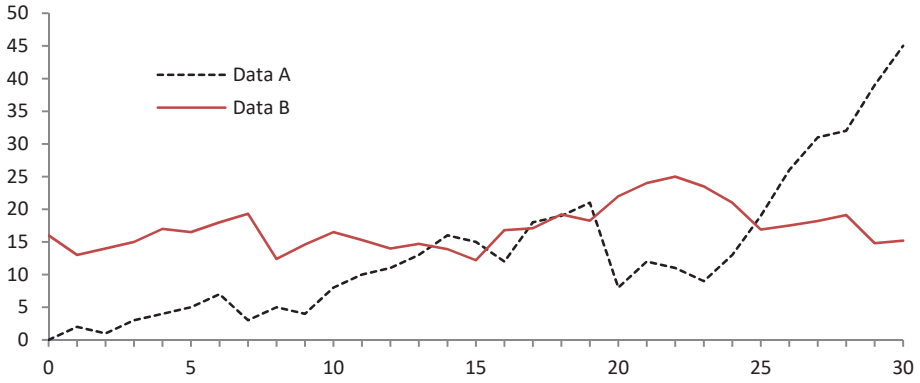

Fig. 1. A figure caption is always placed below the illustration. Please note that short captions are centered, while long ones are justified by the macro package automatically.

Theorem 1. *This is a sample theorem. The run-in heading is set in bold, while the following text appears in italics. Definitions, lemmas, propositions, and corollaries are styled the same way.*

Proof. Proofs, examples, and remarks have the initial word in italics, while the following text appears in normal font.

For citations of references, we prefer the use of square brackets and consecutive numbers. Citations using labels or the author/year convention are also acceptable. The following bibliography provides a sample reference list with entries for journal articles [1], an LNCS chapter [2], a book [3], proceedings without editors [4], and a homepage [5]. Multiple citations are grouped [1–3], [1, 3–5].

References

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