Local Type Inference for Polarised System F with Existentials

ANONYMOUS AUTHOR(S)

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Additional Key Words and Phrases: Type Inference, System F, Call-by-Push-Value, Polarized Typing, Focalisation, Subtyping

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1 INTRODUCTION

$N = M$

ACM's consolidated article template, introduced in 2017, provides a consistent LaTeX style for use across ACM publications, and incorporates accessibility and metadata-extraction functionality necessary for future Digital Library endeavors. Numerous ACM and SIG-specific LaTeX templates have been examined, and their unique features incorporated into this single new template.

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2 OVERVIEW

3 DECLARATIVE SYSTEM

3.1 The Language

The types of $\mathrm{F}^{\pm}_{\exists}$ are given in fig. 1. They are stratified into two syntactic categories (polarities): positive and negative, similarly to the Call-By-Push-Value system [Levy 2006]. The negative types represent computations, and the positive types represent values:

- α^- is a negative type variable, which can be taken from a context or introduced by $\exists$.
- a function $P \longrightarrow N$ takes a value as input and returns a computation;
- a polymorphic abstraction $\forall \overrightarrow{\alpha^+}.N$ quantifies a computation over a list of positive type variables $\overrightarrow{\alpha^+}$. The polarities are chosen to follow the definition of functions.

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– a shift $\uparrow P$ allows a value to be used as a computation, which at the term-level corresponds to a pure computation **return** v.
+ α^+ is a positive type variable, taken from a context or introduced by $\forall$.
+ $\exists\overrightarrow{\alpha^-}.P$, symmetrically to $\forall$, binds negative variables in a positive type P.
+ a shift $\downarrow N$, symmetrically to the up-shift, thunks a computation, which at the term-level corresponds to $\{c\}$.

Negative declarative types

$$\begin{array}{lll} N,\ M,\ K & ::= & \\ & \mid & \alpha^- \\ & \mid & \uparrow P \\ & \mid & P \longrightarrow N \\ & \mid & \forall\overrightarrow{\alpha^+}.N \end{array}$$

Positive declarative types

$$\begin{array}{lll} P,\ Q,\ R & ::= & \\ & \mid & \alpha^+ \\ & \mid & \downarrow N \\ & \mid & \exists\overrightarrow{\alpha^-}.P \end{array}$$

Fig. 1. Declarative Types of $\mathsf{F}^{\pm}_{\exists}$

Definitional Equalities. For simplicity, we assume alpha-equivalent terms equal. This way, we assume that substitutions do not capture bound variables. Besides, we equate $\forall\overrightarrow{\alpha^+}.\forall\overrightarrow{\beta^+}.N$ with $\forall\overrightarrow{\alpha^+},\overrightarrow{\beta^+}.N$, as well as $\exists\overrightarrow{\alpha^-}.\exists\overrightarrow{\beta^-}.P$ with $\exists\overrightarrow{\alpha^-},\overrightarrow{\beta^-}.P$, and lift these equations transitively and congruently to the whole system.

4 ALGORITHM

5 PROOF

6 EXTENSIONS

7 CONCLUSION

[Botlan et al. 2003] [Dunfield et al. 2020]

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