Hazel Assistant Calculus WIP

Andrew Blinn
University of Michigan, USA
blinnand@umich.edu

Cyrus Omar
University of Michigan, USA
comar@umich.edu

Abstract

The hazelnut assistant calculus provides an extensible framework for type- and value-directed completion and refactoring support in a structured editing context.

CCS Concepts: • **Software and its engineering → General programming languages**.

Keywords: live programming, code completion, refactoring, GUIs

ACM Reference Format:
Andrew Blinn and Cyrus Omar. 2021. Hazel Assistant Calculus WIP. In *Proceedings of ACM Conference (Conference'17).* ACM, New York, NY, USA, 2 pages. https://doi.org/10.1145/nnnnnnn.nnnnnnn

wazzzzzaaaaaaaaaaaaaaaaaaaaa

1 Assistant Calculus

blah blah blah types

TODOs:

- ~~get cursor icons from hazelnut paper~~
- ~~get right arrow for bidi~~
- ~~basic zipper cases~~
- remaining zipper cases
- var + varapp
- proj
- ~~base case for hole~~
- base cases for non-empty holes, incld:
- delete + act for general hexps
- wrap for non-empty-holes

References

$\boxed{\Gamma \vdash \hat{e} \Rightarrow \tau \curvearrowright \mathrm{A}}$ e synthesizes τ, suggesting actions A

$\boxed{\Gamma \vdash \hat{e} \Leftarrow \tau \curvearrowright \mathrm{A}}$ e analyzes against τ, suggesting actions A

$$\frac{\Gamma \vdash e \Leftarrow \tau_2 \qquad \Gamma \vdash \hat{e} \Leftarrow \tau_1 \curvearrowright \mathrm{A}}{\Gamma \vdash (\hat{e}, e) \Rightarrow \tau_1 \times \tau_2 \curvearrowright \mathrm{A}}$$

$$\frac{\Gamma \vdash \hat{e} \Rightarrow \tau_1 \curvearrowright \mathrm{A} \qquad \tau_1 \blacktriangleright_{\rightarrow} \tau_2 \rightarrow \tau \qquad \Gamma \vdash e \Leftarrow \tau_2}{\Gamma \vdash \hat{e}(e) \Rightarrow \tau \curvearrowright \mathrm{A}}$$

$$\frac{\tau \blacktriangleright_{\rightarrow} \tau_1 \rightarrow \tau_2 \qquad \Gamma \vdash \hat{e} \Leftarrow \tau \curvearrowright \mathrm{A}}{\Gamma \vdash \lambda x.\hat{e} \Leftarrow \tau \curvearrowright \mathrm{A}}$$

Figure 1. Suggestion Zipper Cases

$$\frac{\mathsf{Intros}(\tau) \curvearrowright \mathrm{A}_{intros} \qquad \mathsf{Elims}(\Gamma, \tau) \curvearrowright \mathrm{A}_{elims}}{\Gamma \vdash \triangleright ⦇⦈ \triangleleft \Leftarrow \tau \curvearrowright \mathrm{A}_{intros} \cup \mathrm{A}_{elims}}\ \texttt{Suggest Hole Analytic}$$

Figure 2. Suggestion base cases

$$\frac{}{\mathsf{Intros}(1) \curvearrowright \{\texttt{construct triv}\}}\ \texttt{IntrosTriv}$$

$$\frac{}{\mathsf{Intros}(\tau_1 \times \tau_2) \curvearrowright \{\texttt{construct pair}\}}\ \texttt{IntrosProd}$$

$$\frac{}{\mathsf{Intros}(\tau_1 \rightarrow \tau_2) \curvearrowright \{\texttt{construct lam x}\}}\ \texttt{IntrosArrow}$$

$$\frac{}{\mathsf{Intros}(\tau_1 + \tau_2) \curvearrowright \texttt{construct inj L}, \texttt{construct inj R}}\ \texttt{IntrosSum}$$

Figure 3. Introduction suggestions

Conference'17, July 2017, Washington, DC, USA

ACM ISBN 978-x-xxxx-xxxx-x/YY/MM…$15.00
https://doi.org/10.1145/nnnnnnn.nnnnnnn

$$\texttt{Suggest Elims}\ \frac{\mathsf{ElimCase} \rightsquigarrow \mathrm{A}_{case} \quad \mathsf{Var}(\Gamma,\tau) \rightsquigarrow \mathrm{A}_{var} \quad \mathsf{VarApp}(\Gamma,\tau) \rightsquigarrow \mathrm{A}_{varapp} \quad \mathsf{Proj}(\Gamma,\tau) \rightsquigarrow \mathrm{A}_{proj}}{\mathsf{Elims}(\Gamma,\tau) \rightsquigarrow \mathrm{A}_{case} \cup \mathrm{A}_{var} \cup \mathrm{A}_{varapp} \cup \mathrm{A}_{proj}}$$

$$\texttt{ElimCase}\ \frac{}{\mathsf{ElimCase} \rightsquigarrow \{\texttt{construct case x y}\}}$$

$$\texttt{Var}\ \frac{\mathit{TODO}}{\mathsf{Var}(\Gamma,\tau) \rightsquigarrow \mathit{TODO}} \qquad \texttt{VarApp}\ \frac{\mathit{TODO}}{\mathsf{VarApp}(\Gamma,\tau) \rightsquigarrow \mathit{TODO}}$$

$$\texttt{Proj}\ \frac{\mathit{TODO}}{\mathsf{Proj}(\Gamma,\tau) \rightsquigarrow \mathit{TODO}}$$

Figure 4. Elimination suggestions