Oslo Special Year kick-off conference 2018/8/27-29
my talk 3:30 on 8/27

title "Some projects I'd like to work on"

Intro. Actually, it's one project with several parts - < UniMath development >

That sort of works, because Vladimir, in one of his 5 talks on it, gave 3 definitions of UniMath: (2017 July)

(1) a univalent foundation of mathematics
(2) a formal language for implementing
(3) a github repository containing a library of proofs, based on Coq, which aims

It aims to:

(0) formalize a substantial body of mathematics

As VV pointed out, we need a better substitute to support

(1) resizing
(2) (oo,1) - categories
(3) computation of univalence (cubical TT)

&

(4) oo,1 - categories
(5) simplicial semantics for HIT's. (simplicial TT)
(6) may paper on KnF by genn's & relations

def. ex. category, mention Quillen's def'n, (K0 first)
describe binary chain complexes, l. e. s.

- also transfinite recursion for type

\(( X \ \text{w.o. set}, P : \Pi X \ Type, \) \\
\( r : \Pi x : X \ ( \Pi y : X \ ( y < x \ \rightarrow \ P \ y ) \) \\
\( \rightarrow \Pi x : X \ P \ x ) \)

- also dependent recursion for \( S^1 = B \Sigma \)

\(( X : S^1 \rightarrow \ Type, \ x : X(\text{base}), \) \\
\( l : \text{loop} \# x = x \rightarrow \Pi t : S^1 X(\text{t}) \)
(1) Resizing

Unimath current disables universe check.

Cog now has "universe polymorphism".

So we can implement prop2 resizing this way

Definition resize : [i : Type i] i

In a prop T : Type i := \lambda_{i} T.

Mention we need Cog not to connect some universe inequalities to equalities. Try fixing Cog or wait for Matthieu.

(2) If cubical IT works for computation, so should simplicial IT, so I build on exploration of

(4) Lumsdaine-Shulman point out the need to be able to make the pre-suspension of a fibrant family into a fibration in a way compatible w. base change.

Here is a conjecture to focus on.

'\text{def. quasi-fibration in topology}', [Dold-Lashof 1959]

Homogeneous fillers in s. sets : \lambda \rightarrow X

Means f sends the 2 "new"

Simplices to the same simplices modulo degeneracy

\text{if} s \ast \gamma \Rightarrow \delta \ast \gamma \Rightarrow \text{if} \gamma \in \text{im} g \Rightarrow \delta \ast \gamma \in \text{im} g

Pullback along g preserves i on correlates i to an isom.

Adjoin fillers, repeat, get \overset{\sim}{X} \overset{\sim}{\rightarrow} \Gamma ;

Its formation is compatible w. base change.

Cog: if p is a qu-fib'IN, then \overset{\sim}{p} is a fib'IN.
point out a lemma of Quillen from HAKT - I

lemma I a cat.

\[ X : I \to \text{Spaces} \]

\[
\begin{array}{c|c}
p & \downarrow X_i \\
\hline
i_0 \to \cdots \to i_p & \to \text{B} I
\end{array}
\]

If \( X \) sends all arrows to h. eq.'s then
\( p \) is a quasi-fibration

Example \( I = [i] = \{ 0 < 1 \} \to \delta_0 \to \delta_1 \)

get \( \text{Map Cyl} (r) \to \Delta' \) is a q.-f.

now apply the conjecture to get

\[ \begin{array}{c}
\text{Map Cyl} (r) \\
\hline
\tilde{p} & \to \\
\Delta' & \text{q.-f.}
\end{array} \]

but omit assume \( X_0, X_1 \) are fibrant, so we can omit fillers lying just over 0 or 1.

Observe the fibers are \( X_0, X_1 \), thereby proving Bousfield's fact w.r.t. the axiom of choice.