Report Week #5

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Topics covered

- First, motivation is given to study representables. Take an example, a map from $\mathbb{R}$ to a space X sees a curve in X.

- Next, we define the functor H^A for $A \in \mathcal{A}$ and the condition for a functor X being representable. The importance for the category $\mathcal{A}$ to be locally small is stressed. We also introduced a jargon — representation.

- The definitions above are well illustrated by the example $H^1 : \textbf{Set} \rightarrow \textbf{Set}$ with $H^1 \cong Id$ and $H^{\mathbb{Z}} : \textbf{Grp} \rightarrow \textbf{Set}$ with $H^{\mathbb{Z}} \cong U$ where U is the forgetful functor.

- Moreover, we prove Lemma 4.1.10 and Proposition 4.1.11.

- Two old examples from adjunction section are reused to exemplify Proposition 4.1.11. They are

$$\textbf{Top} \quad \overset{U}{\underset{D}{\perp}} \quad \textbf{Set}$$

and

$$\textbf{Vect}_k \quad \overset{U}{\underset{F}{\perp}} \quad \textbf{Set}$$

where $U \cong H^1$ in first case and $U \cong H^k$ in the second case.

- Finally, we define a functor, $H^{\bullet}$ which is the natural transformation between the functors H^A and $H^{A'}$.

Discussion

We discussed all the examples in detail, in particular, the naturality square in each cases was well-understood. We explicitly construct those isomorphisms that were needed to show a functor is representable. Somehow, I was stucked while explaining the proof of Proposition 4.1.11. Although we finally successfully came through the proof, a period of time got wasted. In the end, we ran out of time and didn't manage to talk about the covariant functor being representable and introduce the Yoneda's lemma.

Feedback

I got the some constructive feedbacks from the others: try to use different marker, erase explained work and divide the boards into section when working with the board to avoid any confusion. On the other hand, some of them also felt that the overall presentation was good, easy to follow and well-structured. The presentation was enriched with good examples.

Reflection

I am a bit unorganised when presenting the proof of the proposition. I should be more prepared next time to keep the flow of the presentation, so that more time can be saved.

When introducing new definition, I try to give them some intuition and motivation to stimulate their understanding and make sense of those obscure definitions.

Everyone was active in the discussion. We analyzed all of the definitions, examples and proofs thoroughly. Everyone contributed in any means and helped others to better understanding the material.