Category Theory Presentation Report 2018

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Present

Yiming, Keeley, Josh, Chris, Yossi and Roger were present.

Covered in the presentation

Definition of a limit, definition of colimit, example of a limit and colimits, definition of products, pullbacks and how are they special case of limits.

Summary of the presentation

I started my talk by defining what a limit is. I went over the definition of a diagram and cone to define limit and pointed out that a limit is equipped with the universal propert and all special cases like products and pullbacks also share this property. I, then mentioned that a colimit is the dual of a limit, that is, you can reverse all the direction in the definition of limit to get colimits. I draw an analogue between limit/colimit with kernel/cokernel with product/coproduct.

I explained how can you can think of kernels are things which are "map to" and cokernels are things "mapped to" which is very similar to the definition of limits and colimits respectively. I thought it wouldn't do justice to the material if no examples were given so I explained how cokernel is actually a colimit in the category of vector spaces. The definition of a cokernel doesn't change irrespective of the category, its just that I needed a category to work with so I picked **Vec**. To describe, cokernel I went to through the set-therotic definition and then explained it in terms of diagrams and cones. Chris mentioned during the talk that is cokernels are just coequalizers so we spent about 30 seconds why that's the case. I did another example of a colimit. The set of of rational numbers where the denominators are powers of 5 is a colimit . We went into details of this.

I, then defined products briefly mentioning what the diagram and cones are in the definition. How products are a special case of limits and have the same universal property as limit. I briefly mentioned that you can reverse the direction of arrows in the definition of product to get the definition of coproduct. Everyone seemed comfortable with it. Then I defined pullbacks and talked why are they a special case of limit.

Difficulties

I felt like there was too much to cover in a short duration of time. I felt like the definition of limit is a little heavy to grasp at once because leinester describes cone, diagrams as functors before

actually saying what a limit is. I didn't write out the definition of the cone explicitly and I didn't use the same notation as leinester. So may I should have just used the same notation as the book. I didn't write out the definition of a cone because I thought it can just be seen by the diagram on the board. Although, every time I gave examples of limit or colimits or definition of product, etc, I used different color markers to point out what the diagram and what the cones are in the example or the definitions. It seemed to me that the audience was not following while I was writing the definitions but were clear when I drew more diagrams.

Another small difficulty for me was using the word 'diagram' was that its used as a functor and just as a picture also.

There were few question during questions raised while I was giving examples what the indexing category is and some interesting remarks were made by Chris and keeley.

Another problem I was facing was that I was unaware of what level of understanding people have because assignment 1 already covered a lot of examples of products and coproducts so I wanted to give example which were not already given and non-trivial at least by my standards.

There was no time left for to describe what equalizers are.
I was already overtime and took 3 mins of Yossi's time. I think all possible questions were raised during the presentation and I tried hard to make the discussion more interactive by asking if each part is clear. But next if I was to present a big of lot of material then I would give less examples and if its of utter importance to give example, then I would go so detail in those.

Feedback

I was feeling guilty about no covering equalizers but later it was pointed out by talking to people that there was too much to cover in 25 mins time. Roger pointed out after the discussion that there was too much to cover and the was a good example.