

YOW! DATA 2021

# Assisting design with machine learning in Canva's editor



Will Radford  
Data Scientist  
Canva

# Today's talk

Problem

What is a template anyway?

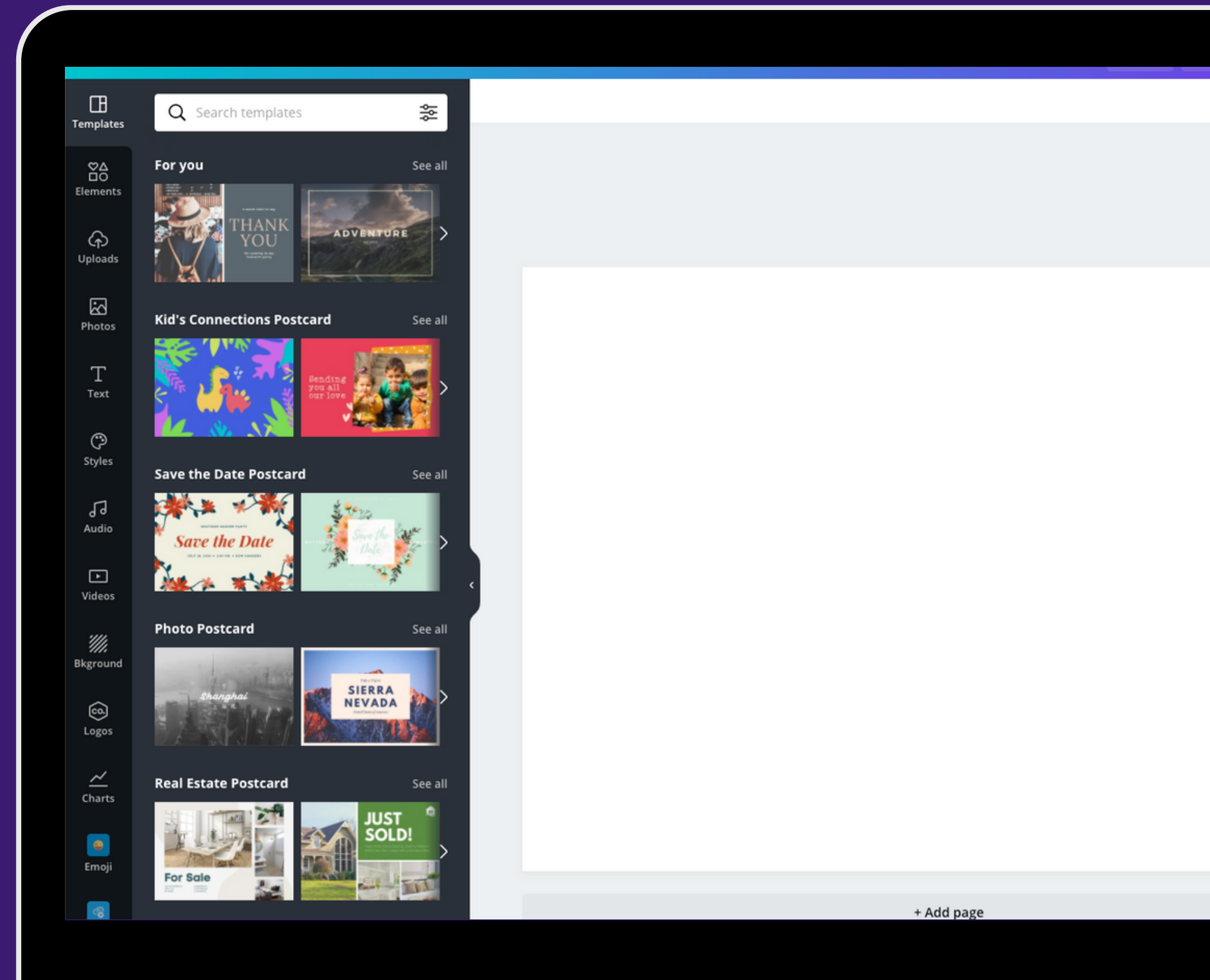
What we did

What we learned

# Canva

Visual communication platform with a mission to empower everyone in the world to design anything and publish anywhere.

The editor

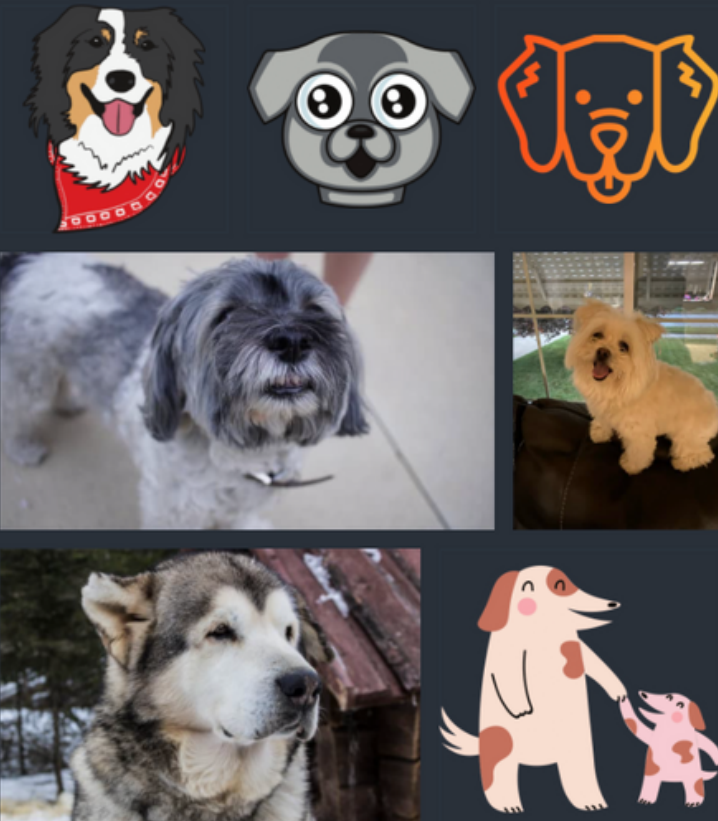


# Where's the ML?

Search: doggo


All Photos Graphics Videos Audio

Canva is donating all proceeds from any paid media used in your design towards relief and medical equipment for the COVID-19 crisis in India.

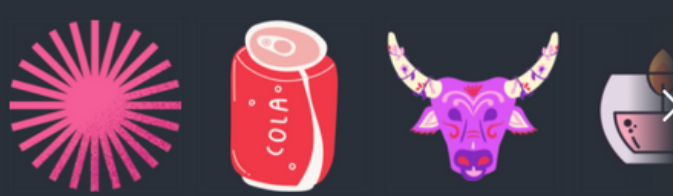


A collection of dog-related assets including three cartoon dog faces (a Bernese Mountain Dog, a grey dog, and an orange dog), two photographs of real dogs (a grey dog and a small white dog), and two more illustrations (a husky and a dog with a child).

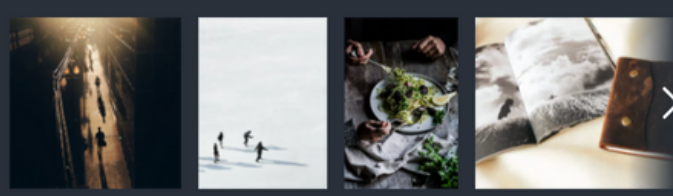
Lines & Shapes See all



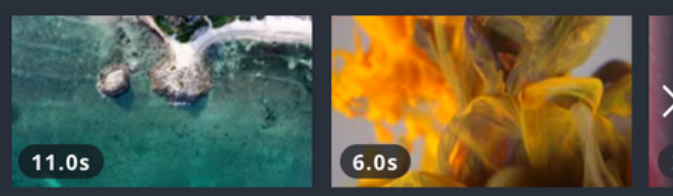
Graphics See all



Photos See all



Videos See all




Audio See all

Happy Whistling Ukulele  
Happy Childrens' Tunes • Bright ...  
2:03 FREE


Ukulele Song  
Solo Instruments • Happy • Bright

Search templates

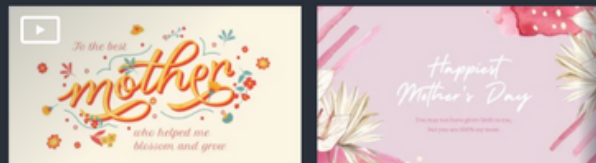
Simple Presentation See all



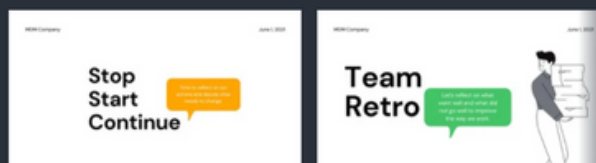
Education Presentation See all



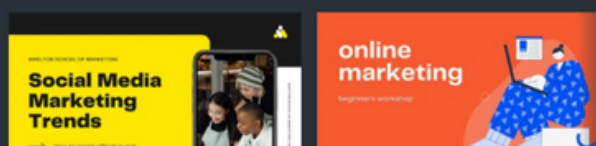
Events and Special Interest Presenta... See all



Brainstorm Presentation See all



Marketing Presentation See all



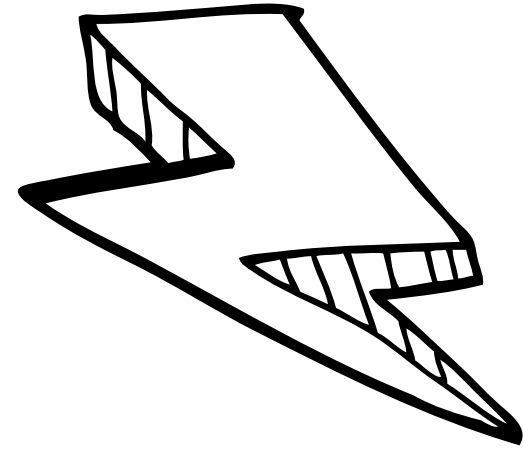
Effects

Search Effects

Background Remover  
Remove the background of your image with one click.

Plus

- User feedback
- Marketing & Engagement
- Editor product

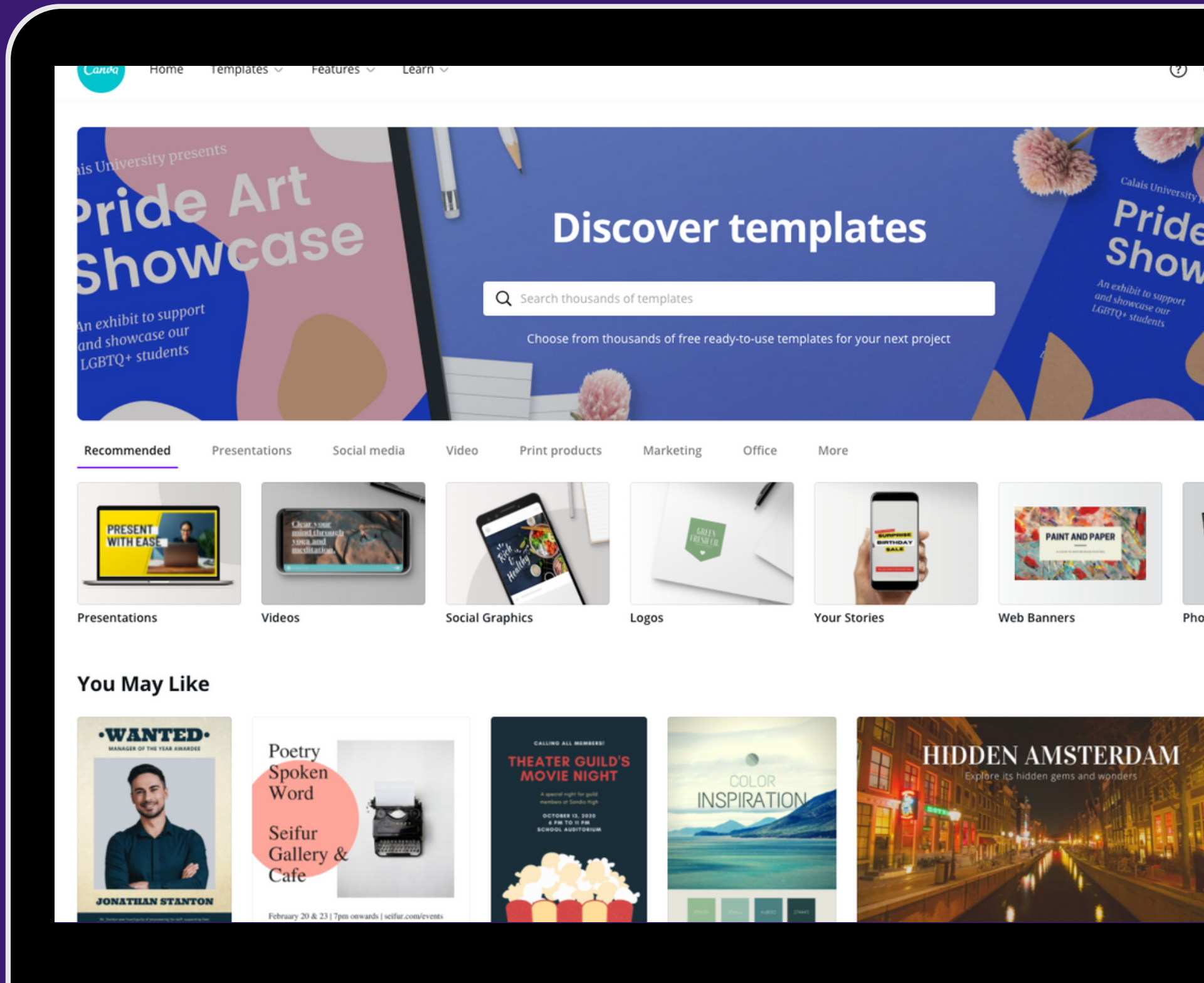


Problem



# Canva 😍 Templates

- Makes great design simple.
- More than 500k in more than 100 languages.





How might we...

*empower exploration?*



# Spoiler



Home File Resize Tools Share Preview Download

Templates Search Templates Pro

Food Instagram Post See all

Photos Elements Text Music Videos Bkground Uploads Folders

LEMON SQUEEZE  
Fresh and Organic

Clear Lake  
SEAFOOD GRILL  
123 ANYWHERE ST., ANY CITY, ST 12345

Sale Instagram Post See all

END OF SEASON SALE  
GET 50% OFF! SHOP NOW AT REALLVOREALTY.COM

LAMPLIGHT MOBILE SYSTEMS  
CYBER MONDAY SUPER SALE  
Today only! Get up to 75% off on selected items.

Love Instagram Post See all

LOVE IS LOVE  
LOVE ALWAYS WINS.  
...especially when you let it be kind to each other.

LOVE YOU  
FOREVER ALWAYS  
SWEET HEART

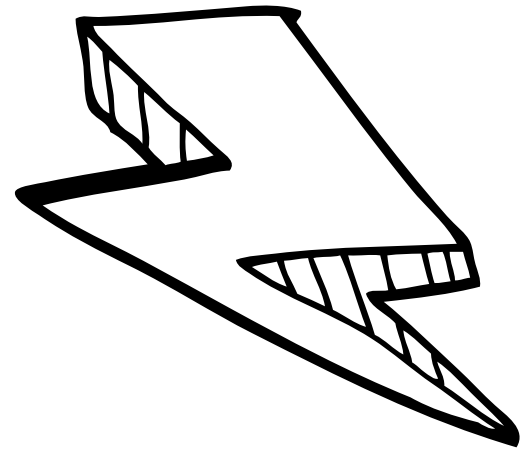
Pretitle Mr Dafoe 77.1 A ...

Data in th

SEAFOOD GRILL

123 ANYWHERE ST., ANY CITY, ST 12345

+ Add a new page 46% ↗ Help ?



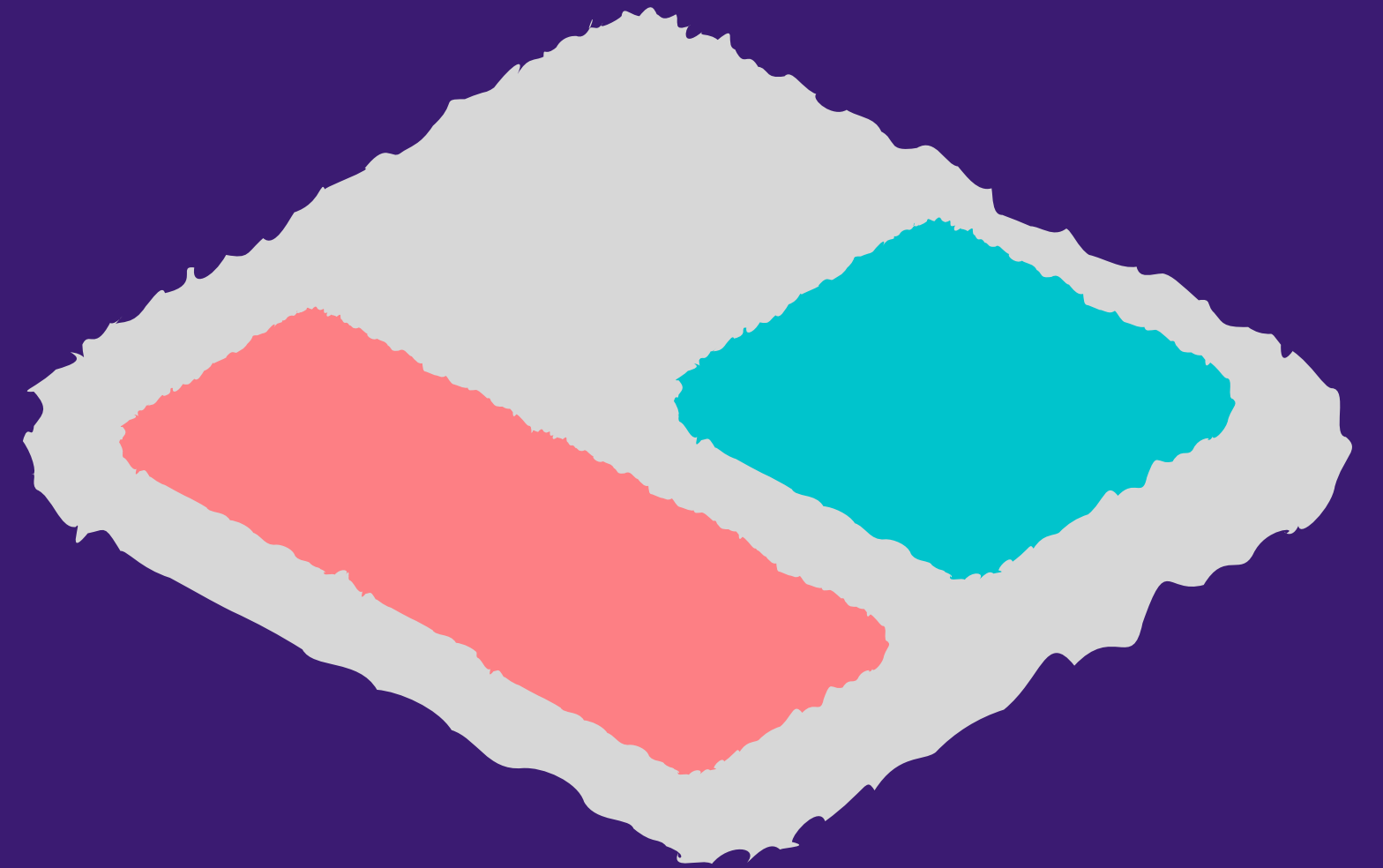
What is a  
template anyway?

# Text plays a role in design

- Information hierarchy
- Marked as metadata in our library
- **Partial coverage**

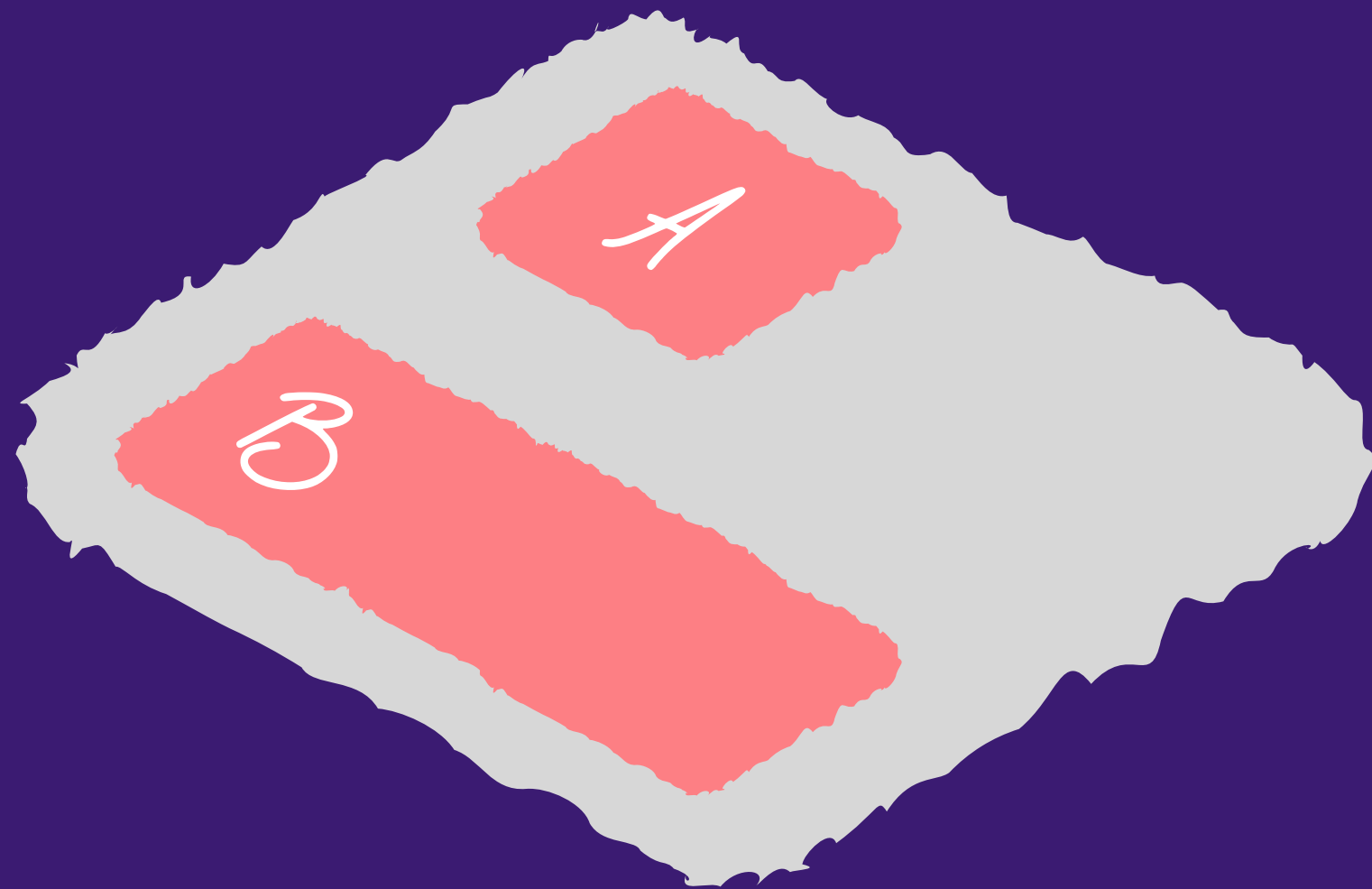
# Templates are designs

- Designs are made of pages.
- Pages contain elements like **images** and **text**.

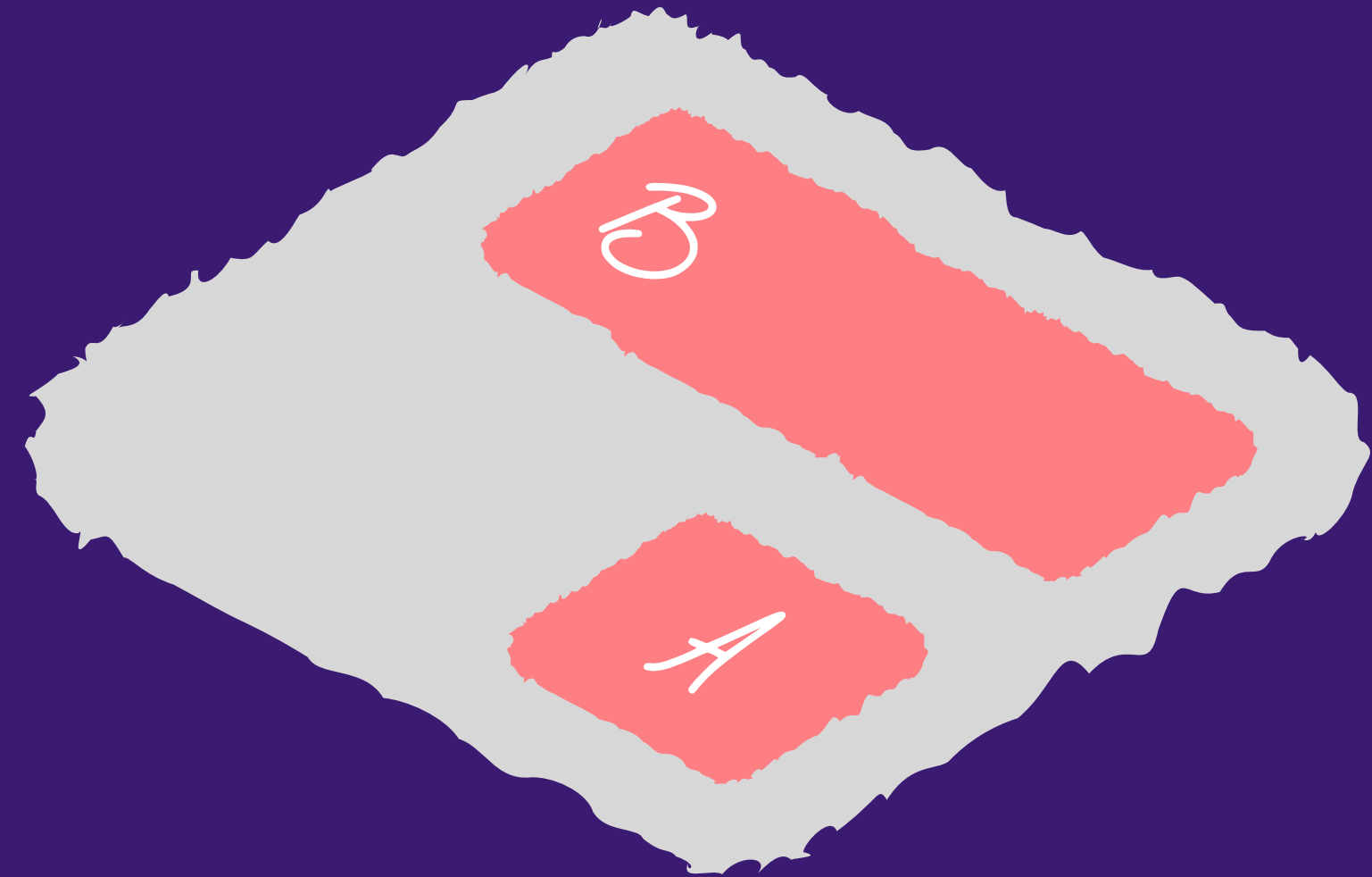




# 💡 What if we transferred the text?

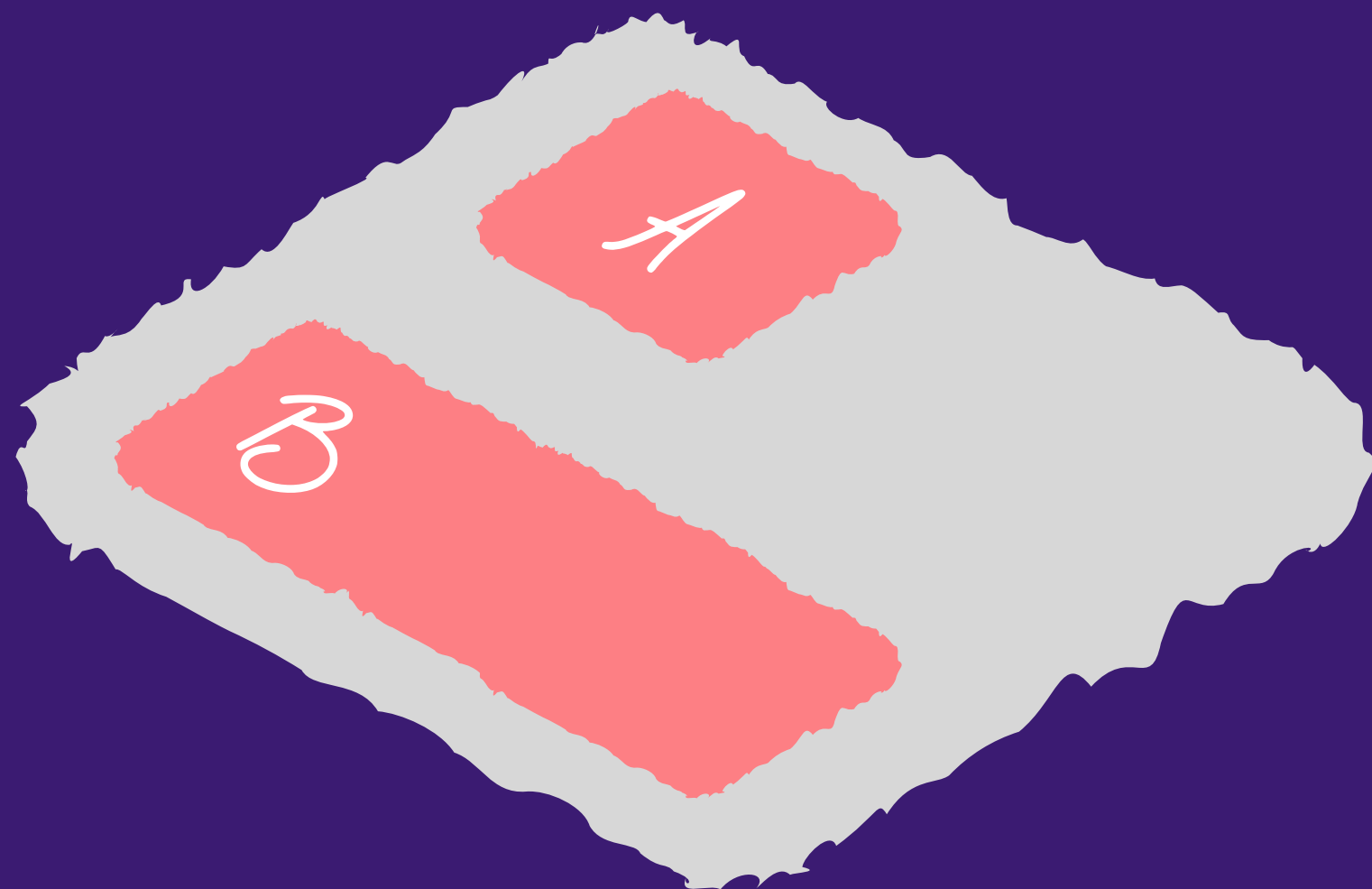


current design

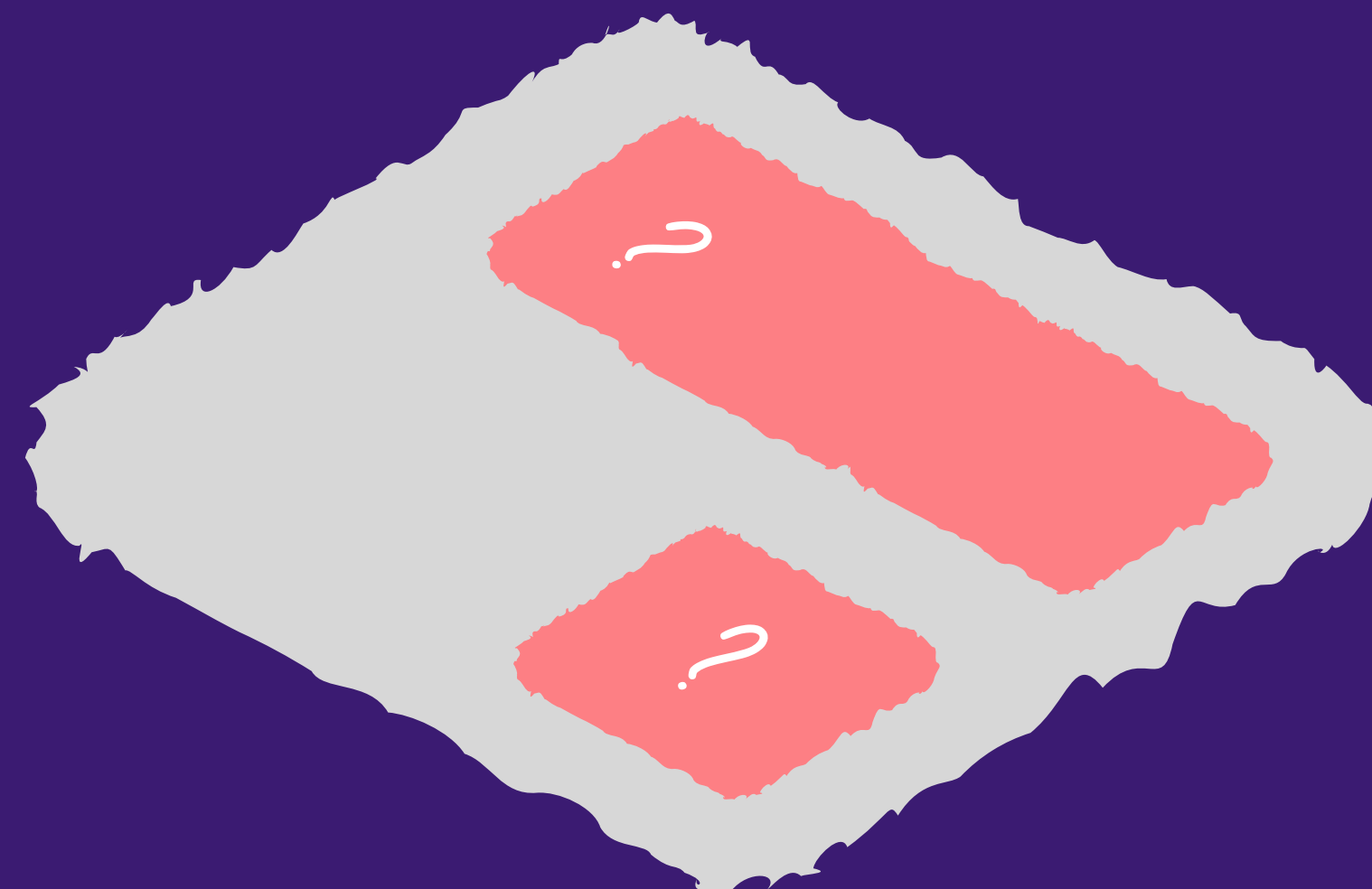


new template

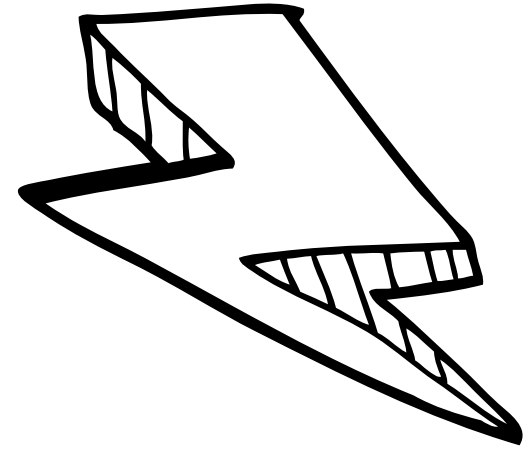
# 💡 Improving library coverage



template with roles



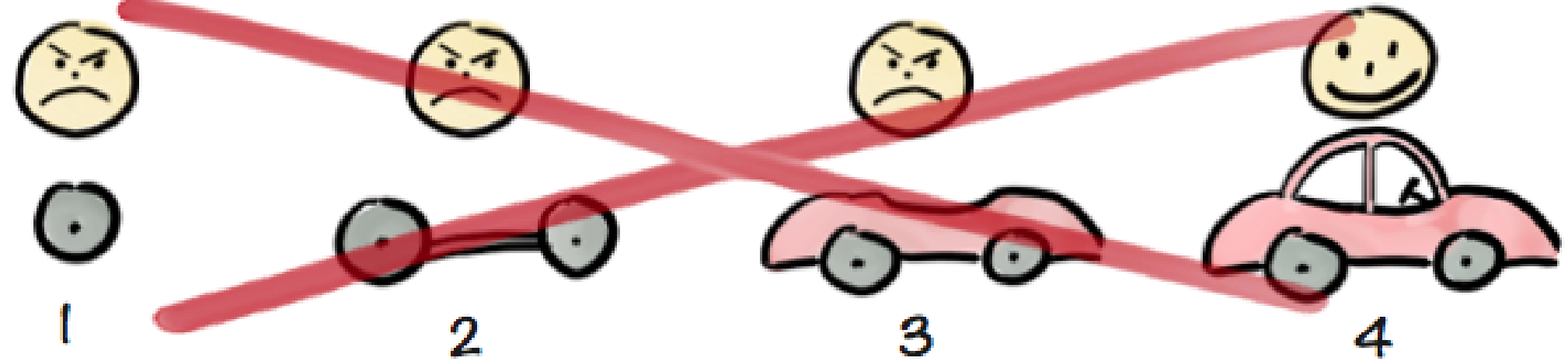
template without roles



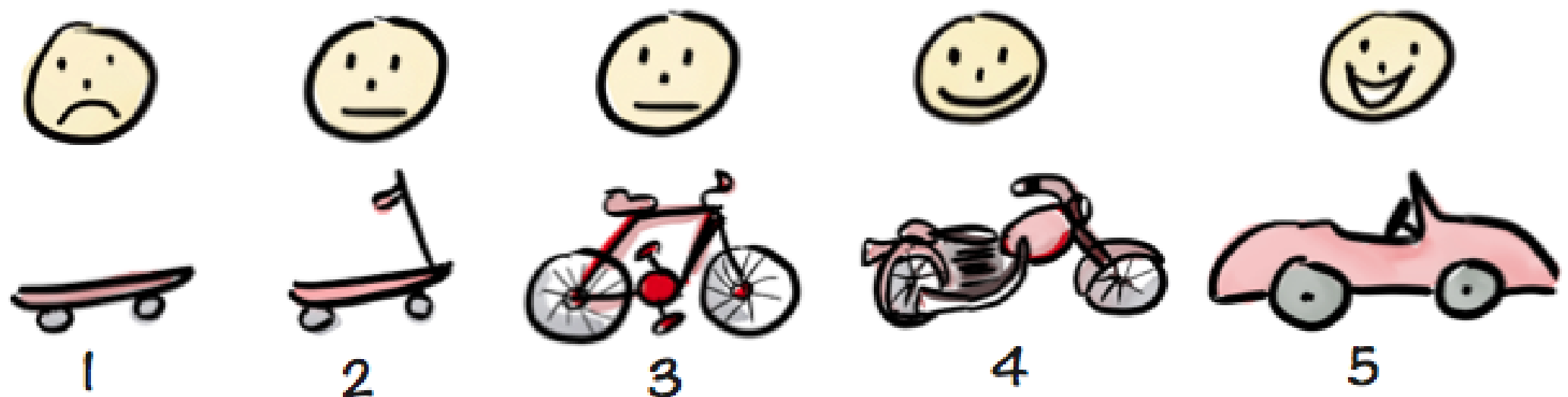
*Interlude*

# Iterate quickly for happier users sooner

Not like this....



Like this!



Henrik  
Kniberg

@henrikkniberg



# Cross functional teams move quickly

Template  
Designer

Product  
Designer

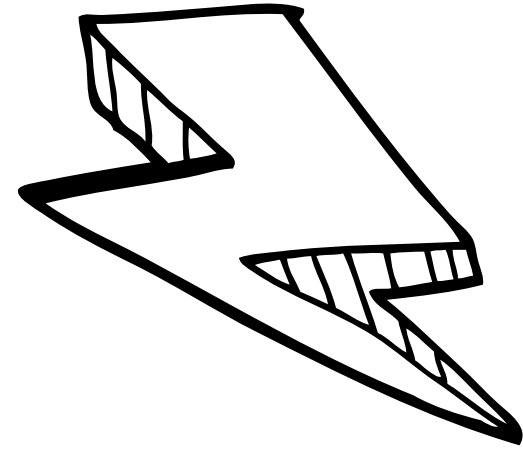
Frontend  
Engineer

Data  
Scientist

Product  
Manager

*Big kudos to my Smart  
Design team-mates!*

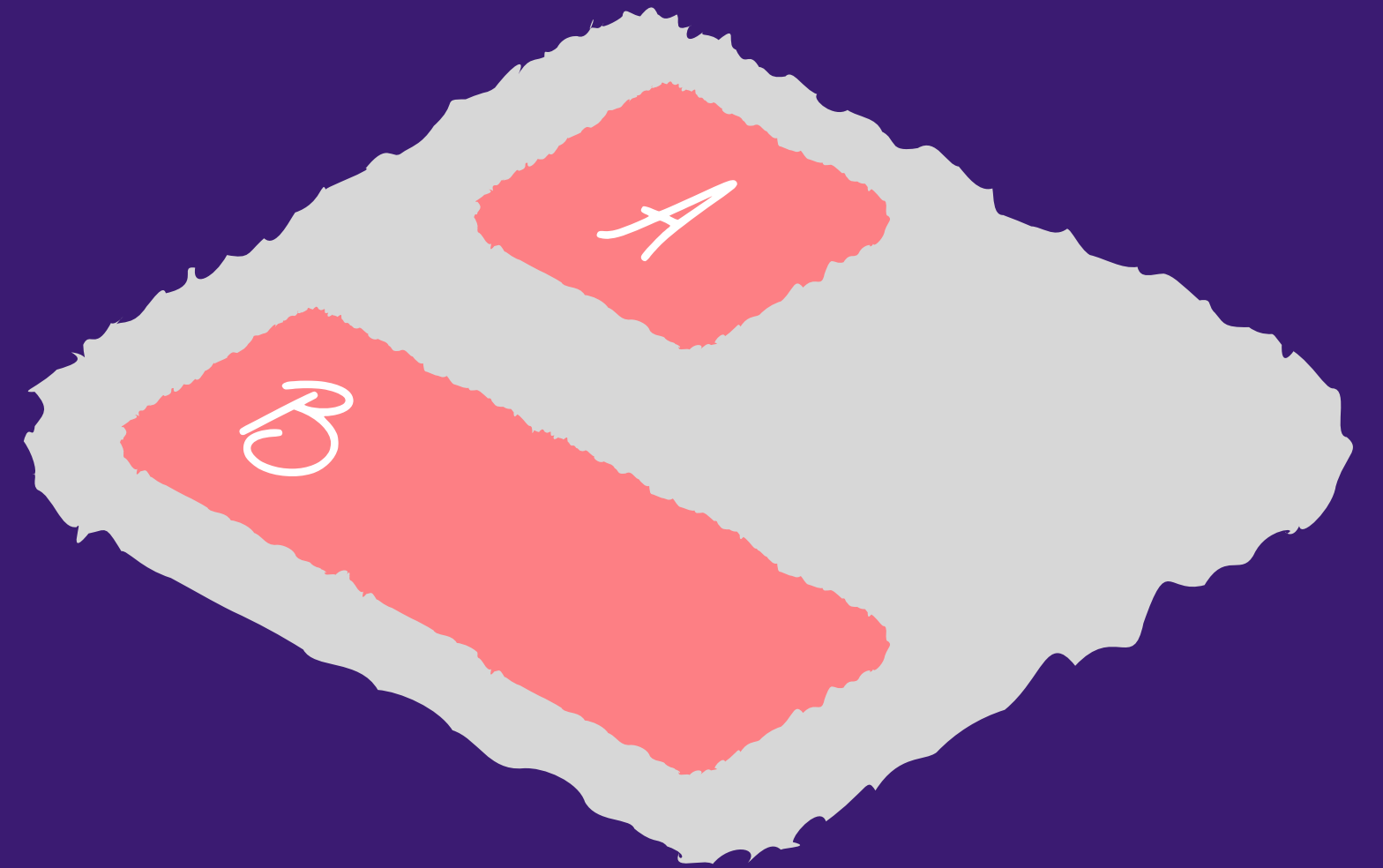




*The model*

# How we frame the task

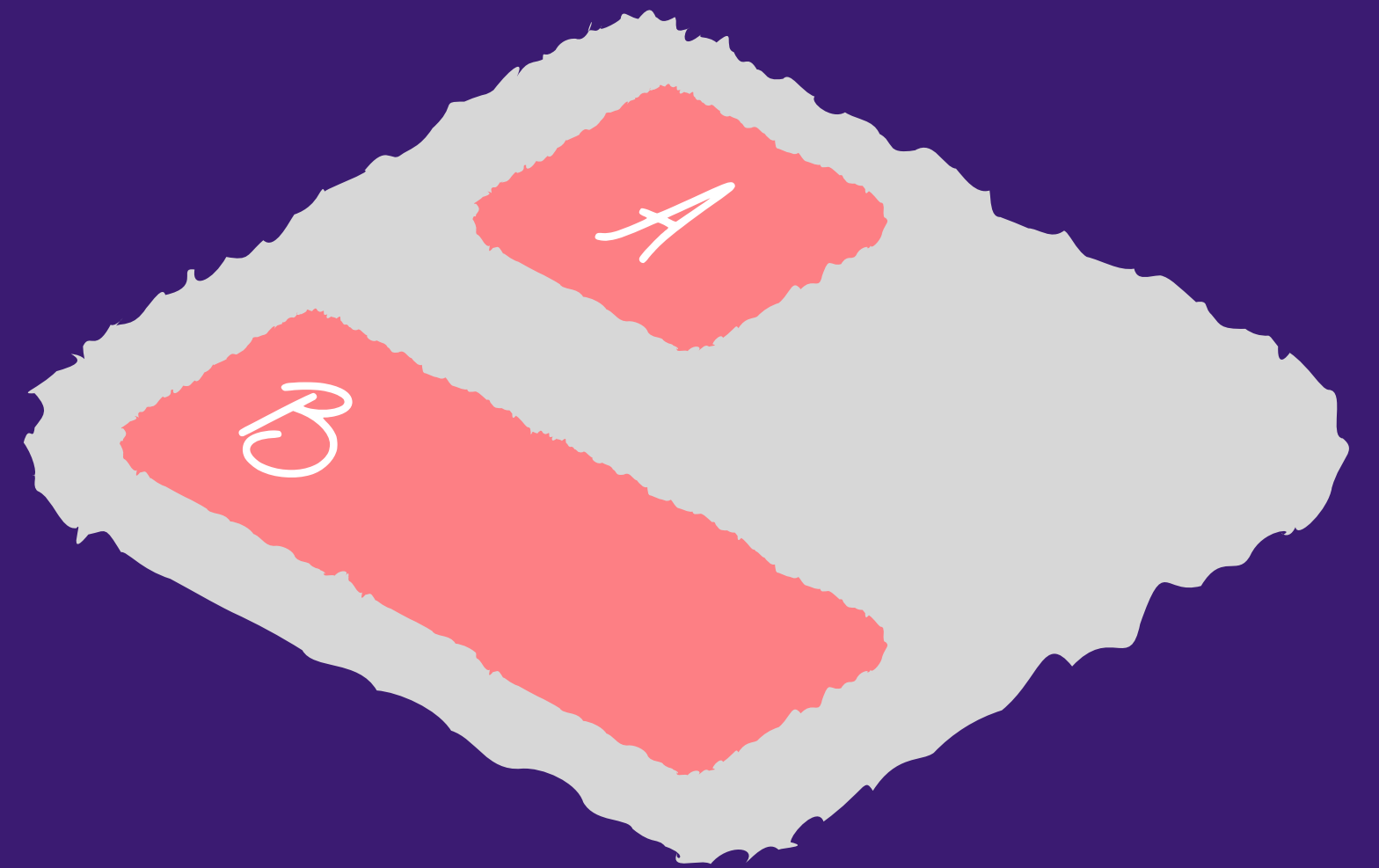
- Element-level prediction
  - title
  - pretitle
  - subtitle
  - paragraph
  - heading
  - do-not-change
- Post-processing rules.



design

# Features

- Position
- Text: size, quantity
- Relative

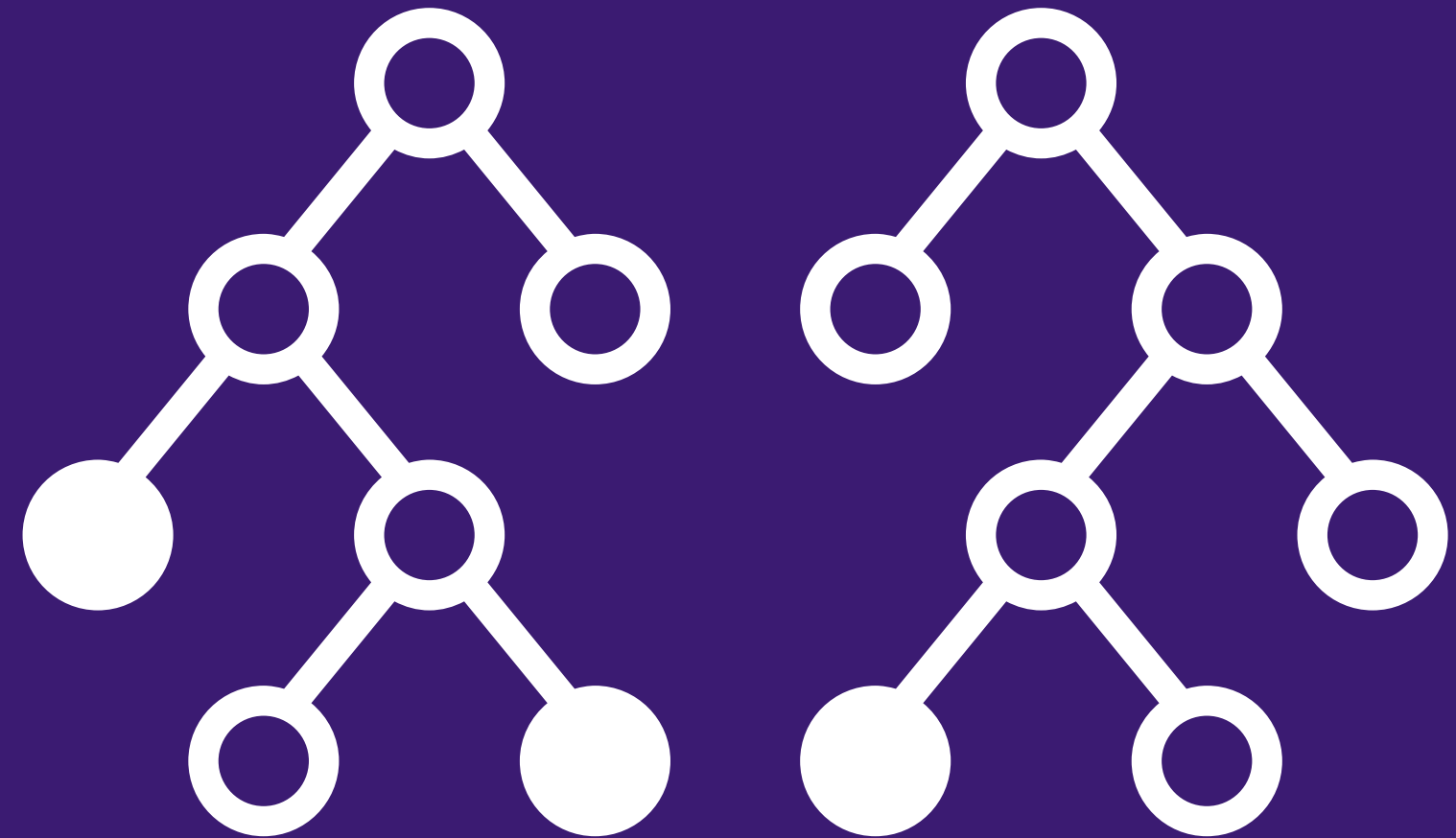


design



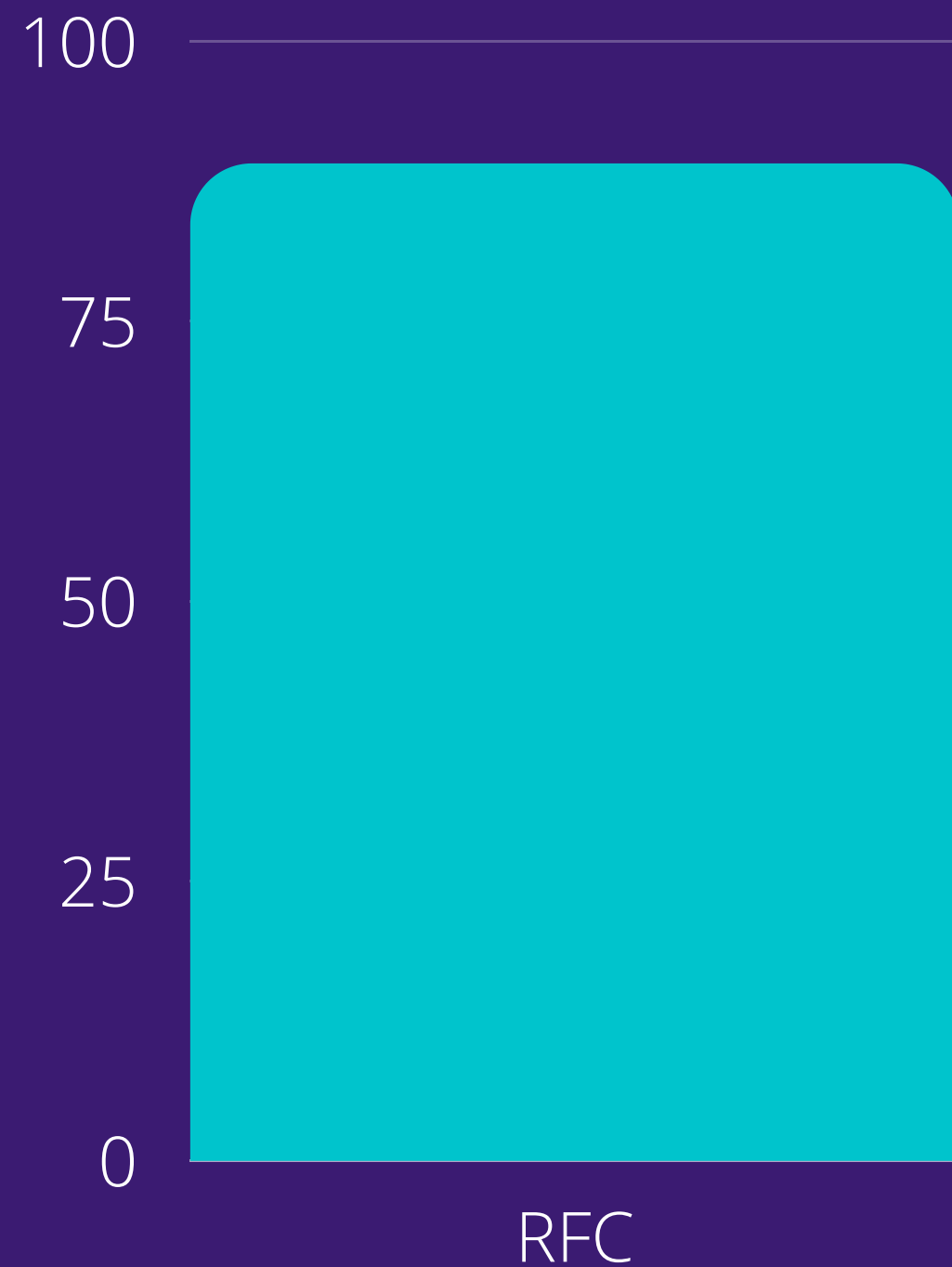
# Random Forest Classifier

- Ensemble of simple decision trees
- Descend trees then vote
- Simple and quick to iterate

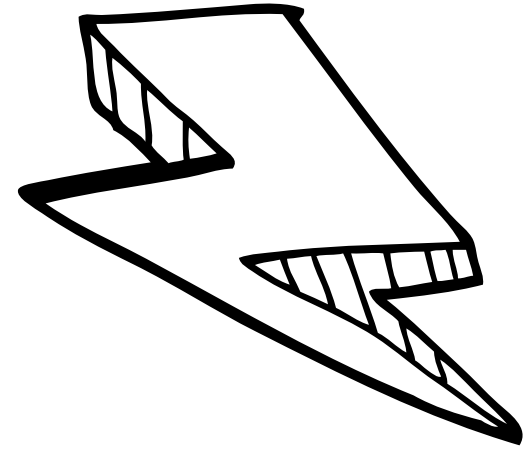


```
if feature.value > threshold:  
    direction = "left"  
else:  
    direction = "right"
```

# Good enough performance

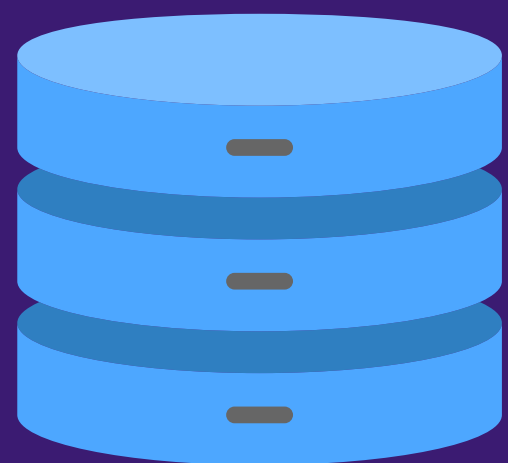


- 80:20 split
- Cross-validation for hyper-parameters
- Micro F1 all labels 89%

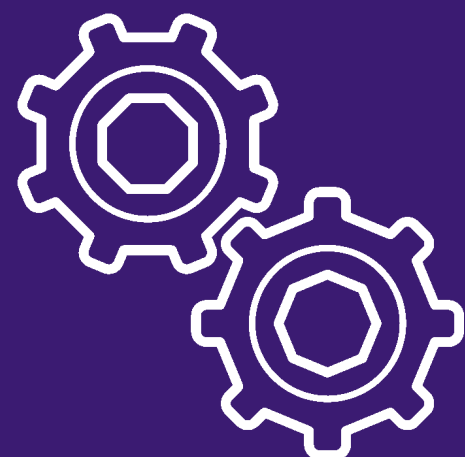


Batch prediction

# Boost coverage



Fetch data



Train model  
on labelled



Predict roles  
on unlabelled

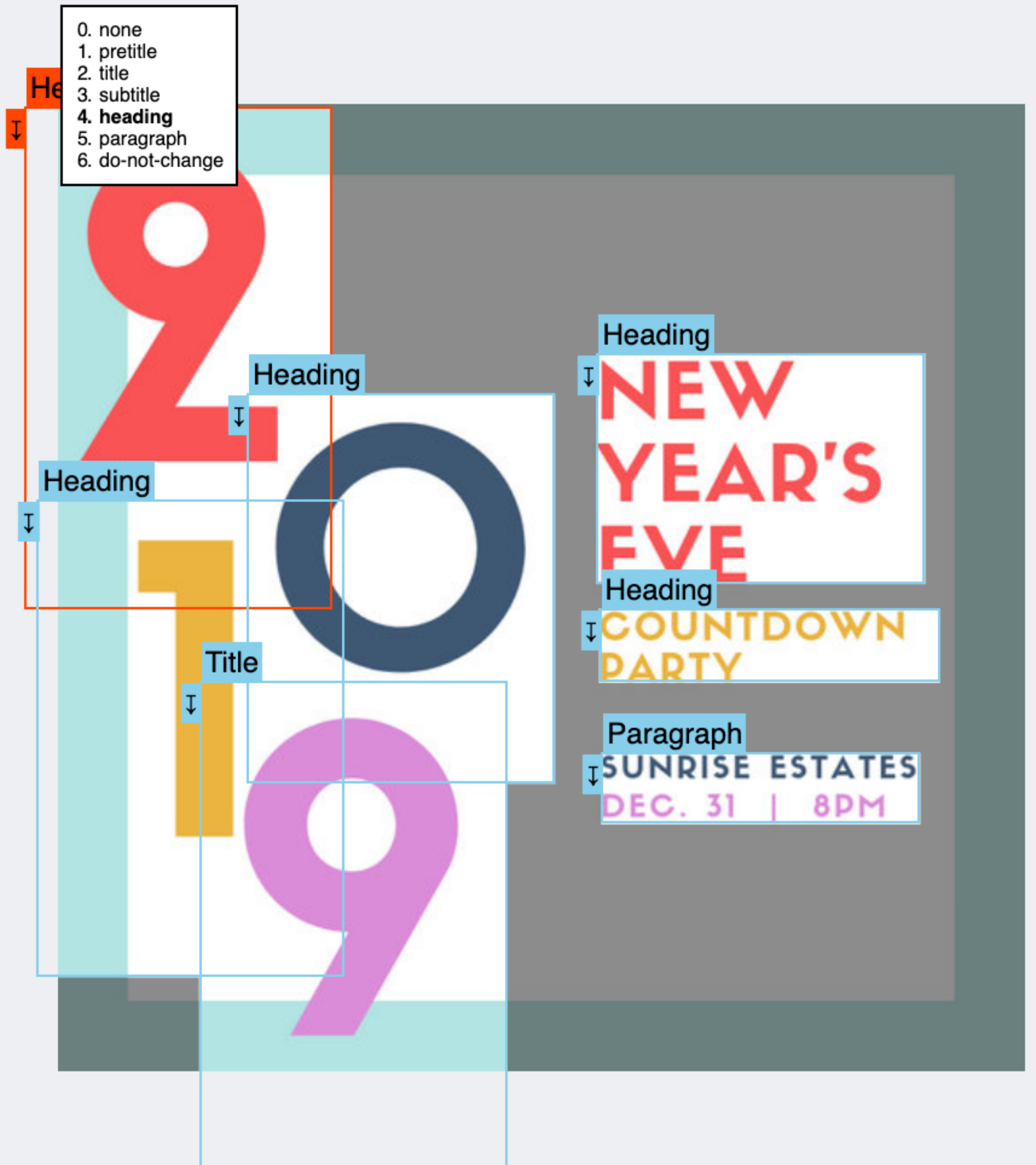


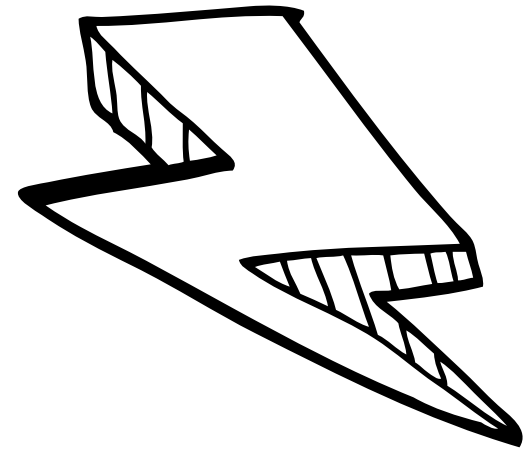
Designer  
checks



Reimport

# Simple annotation tool





*Scale to designers*

# Add to the publish flow



Design  
process



Predict roles on  
their design



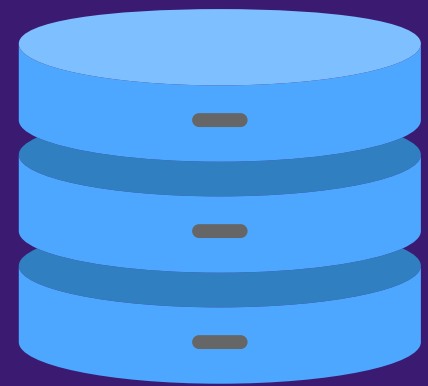
Designer checks  
and fixes



Publish as a  
template



# Porting ML to the frontend

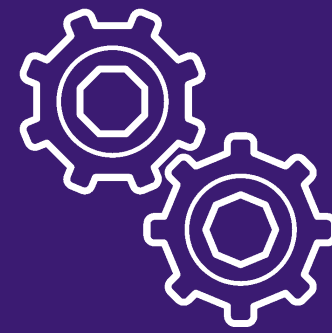


Fetch data

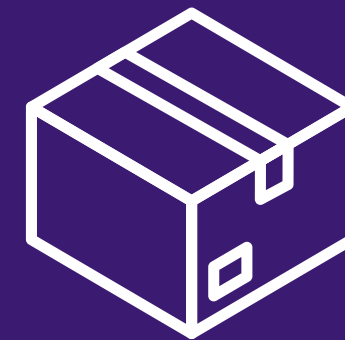


Extract features

TS



Train model



Serialize model



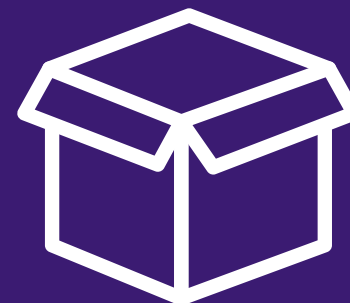
Predict roles

TS



Extract features

TS



Deserialize model

TS



*Not an easy path!*

# Publish tools

The screenshot shows a design tool interface with a top navigation bar containing 'Home', 'File', 'Resize', 'Tools', 'Unsaved changes', 'Instagram Post - Untitled', 'Share', 'Preview', and 'Download'. A left sidebar lists 'Templates', 'Photos', 'Elements', 'Text', 'Music', 'Videos', 'Bkground', 'Uploads', 'Folders', and 'More'. The main workspace displays a text element with the content 'A very important post'. A red box highlights the text with the label 'title (please check)'. The text is styled with bold, italic, and underline. A right sidebar contains a panel titled 'Add Content Roles' with the text: 'Each text element should have a content role in order to be content-transferrable. For elements that not supposed to be transferred, set the "Do not change" role. For platform specific elements (Instagram story handle), set the "Platform element" role.' At the bottom of the right sidebar, a yellow notification box states: 'Some content roles are not set. We tried to guess what they could be and highlighted them in red. Apply predictions if you think they're accurate.' Below this is a link 'Apply predictions' with a globe icon. The bottom of the interface shows a '+ Add a new page' button, a zoom level of '64%', a 'Help ?' button, and a 'Continue' button.

None Kollektif 42 A B I aA ...

title (please check)

***A very important post***

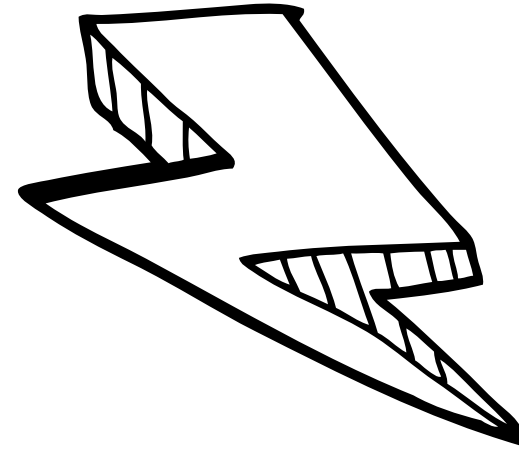
### Add Content Roles

Each text element should have a content role in order to be content-transferrable. For elements that not supposed to be transferred, set the "Do not change" role. For platform specific elements (Instagram story handle), set the "Platform element" role.

Some content roles are not set. We tried to guess what they could be and highlighted them in red. Apply predictions if you think they're accurate.

[Apply predictions](#)

+ Add a new page 64% Help ? Continue



*Scale to users*

# Better default roles for transfer



Template  
exploration



Predict any  
missing roles  
on their design

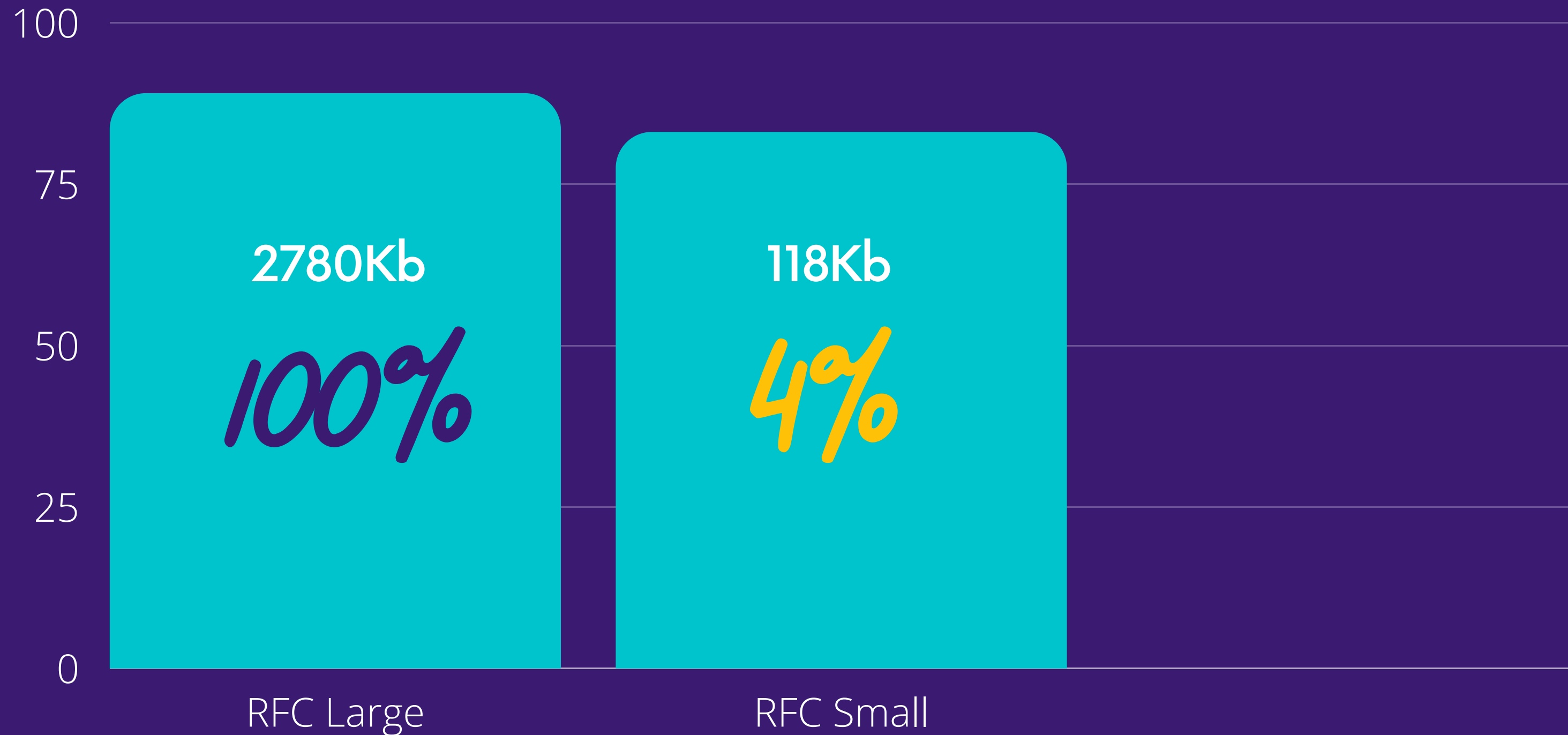


Transfer  
text

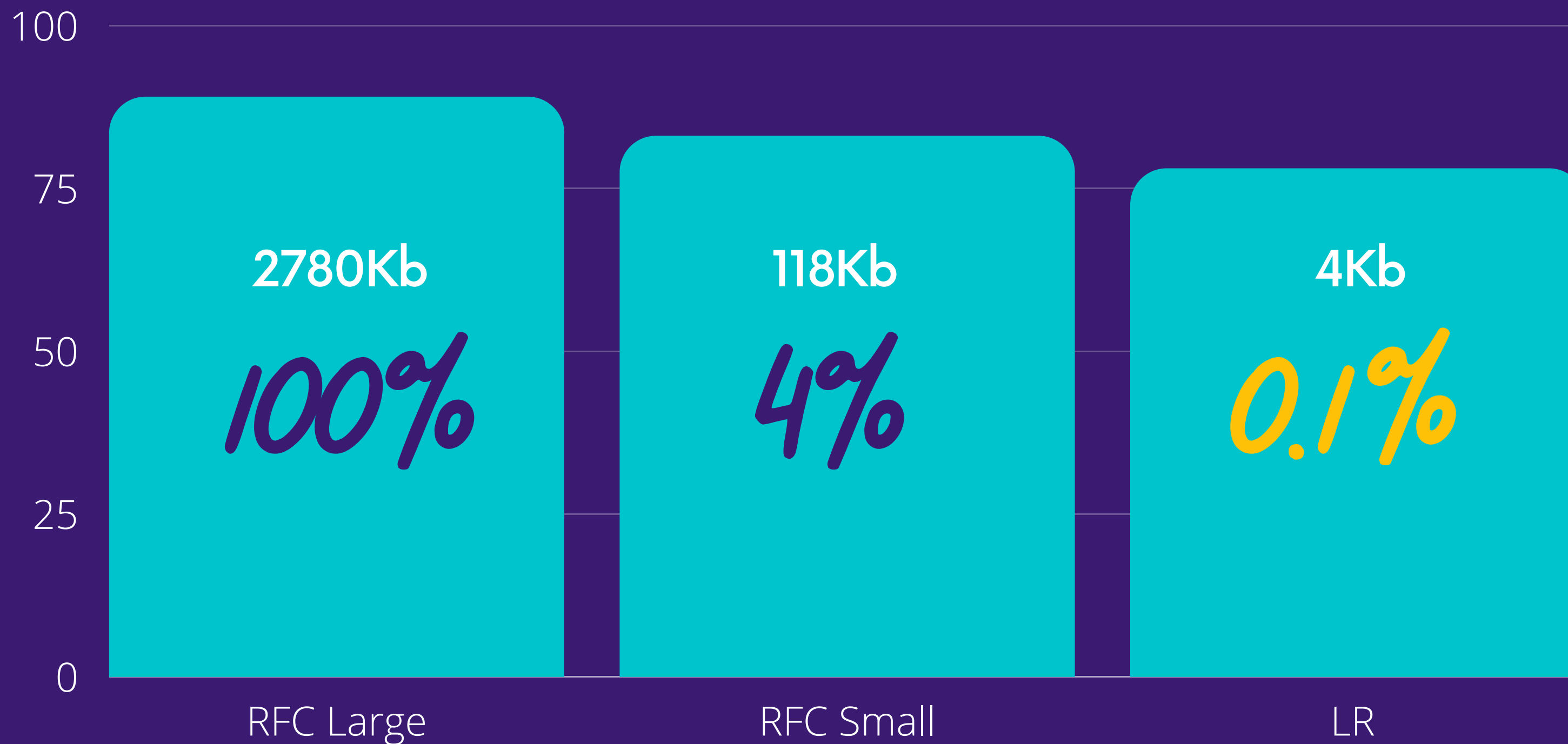
# Trading off size for accuracy



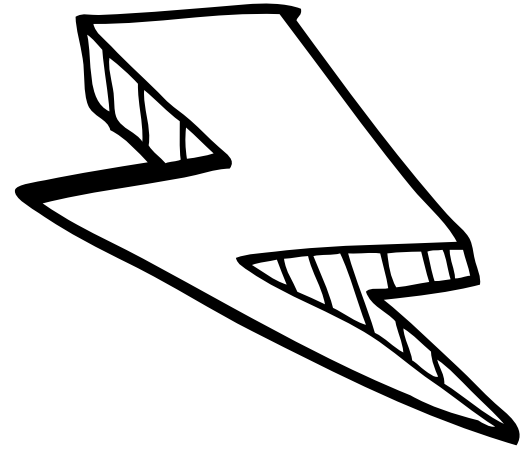
# Fewer smaller trees



# Logistic regression







*What we learned*

# Current weekly impact

*Powering*

**~1/5**

*template  
applications*

*Helping*

**~3M**

*users*



*ML products  
are still  
products*

Start small and  
iterate quickly.



*Understand the  
problem*

Working across  
disciplines helps break  
down barriers.



*Play to ML's  
strengths*

Stick to contexts  
where failures aren't  
fatal.

# Recap

Problem

What is a template anyway?

What we did

What we learned

Thanks!

Canva

PS: we're hiring 😊

[canva.com/careers](https://canva.com/careers)