



## Problem Statement : 3

### AI-Powered Separation of Overlapping Stamps and Signatures

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#### Solution Approaches :

- Using Visual Transformers
  - **Meta** : SAM-2
  - **Microsoft** : Florence-2
- Semantic Segmentation
- Keypoint Detection & Feature Extraction

Idea Title

#### Signature & Stamp Semantic Segmentation

Document



Overlap  
Detection

We have chosen to exclusively use identified overlapping entities.



Stamp



Signature



## Step 1 : Overlapping Signature & Stamp

Document



( Region of Interest  
Detection )



Overlapping Stamp &  
Signature in Document

( Done as  
Bounding Box )



Example from  
the dataset

**YOLO v12** : Computer Vision  
model for Stamp & Signature  
Detection



**Microsoft/Florence-2-base** :  
Finetuned vision transformer on  
dataset for Object detection



Approach for the current step  
in overlap detection.



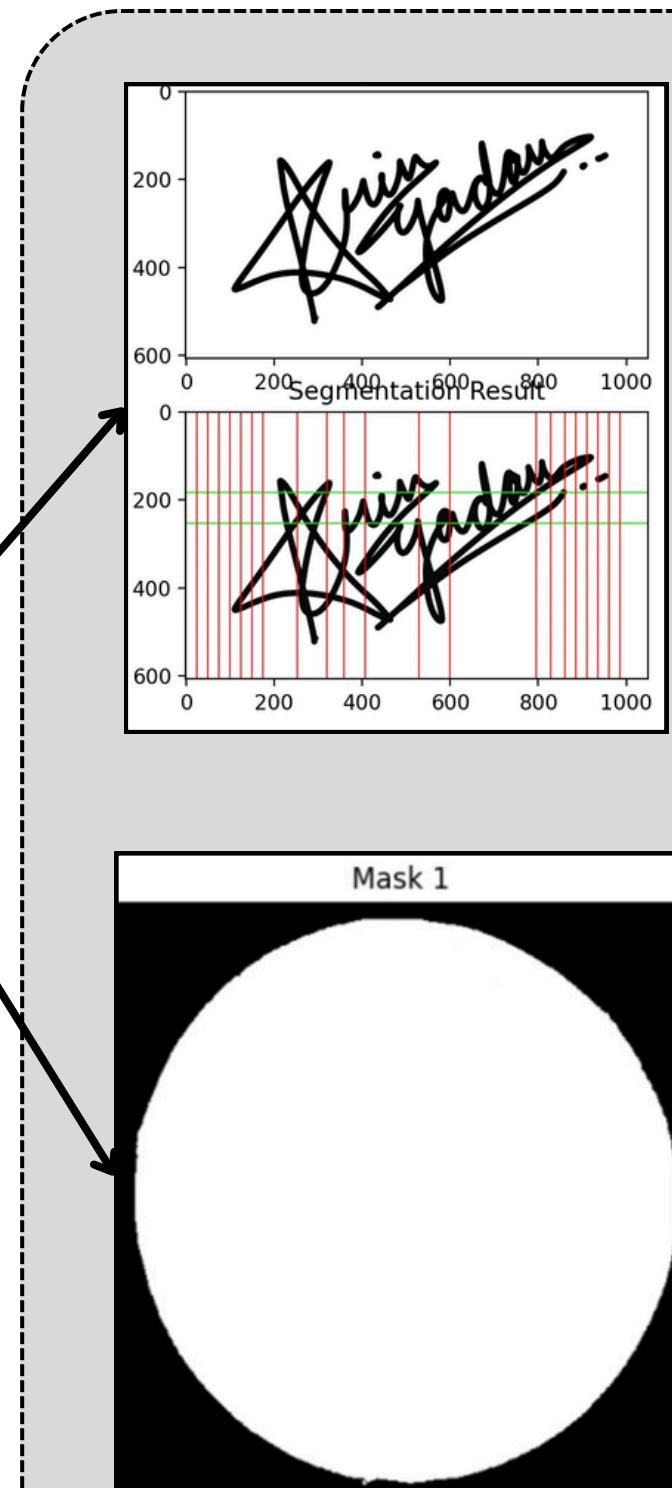
## Step 2 : Data Preparation and Image Processing

( Bounding Box )



Example from  
the dataset

Obtaining the bounding box, we can proceed with the precise segmentation of the signature



Evaluating

- Feature extraction
- keypoint detection

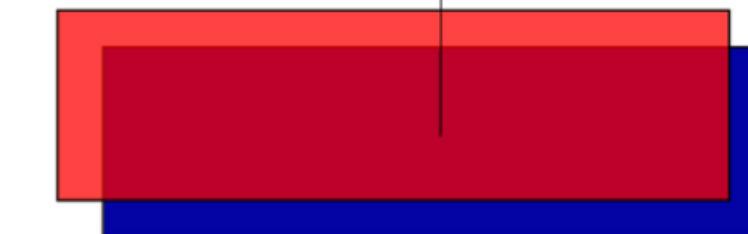
techniques for isolating the signature from overlapping entities.

Evaluating

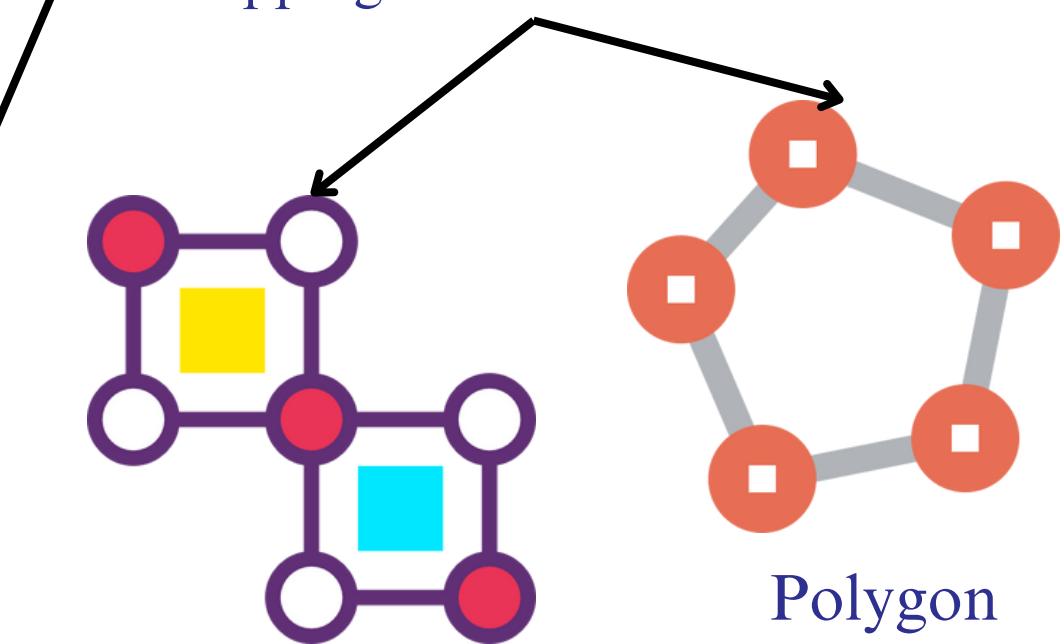
- Masking and
- Classification capabilities

using Vision Transformer models for precise data segmentation.

Overlapping Area



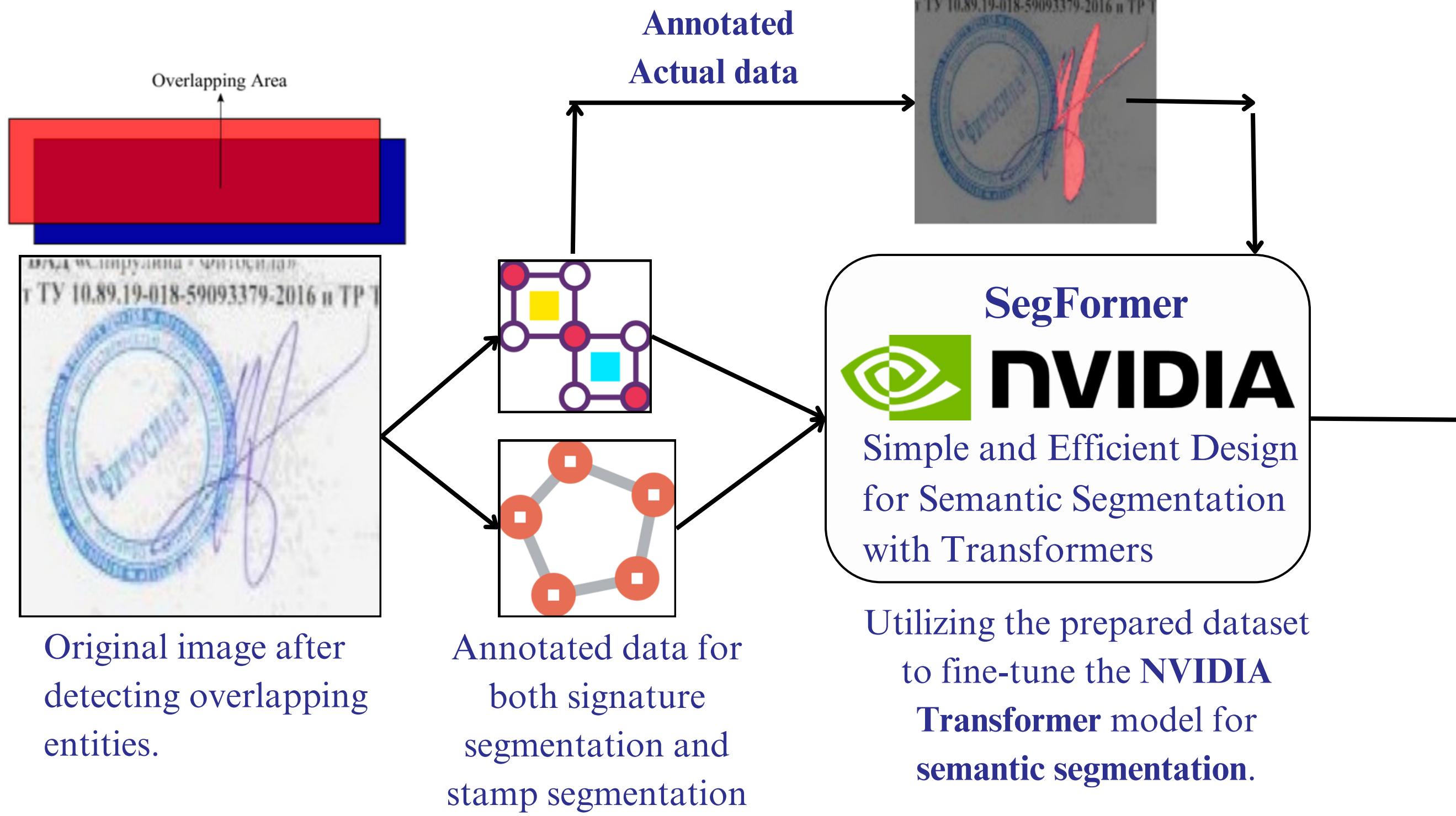
The attempted approach lacked precision in segmenting the overlapping entities.



Polygon  
annotation for  
precise signature  
extraction.  
  
Bounding box  
annotation for  
enhanced overlap  
detection.



## Step 3: Semantic Segmentation for Precise Differentiation



The region containing the signature is masked and segmented for precise extraction



## Step 4: Semantic Segmentation Output

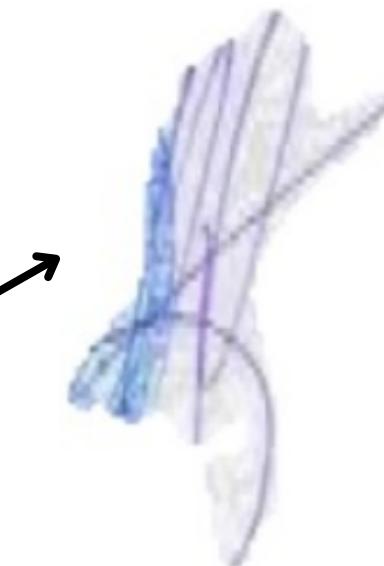
Actual Mask Overlay



Predicted Mask Overlay



Final Extracted  
Signature Segment



Final Extracted Stamp Segment

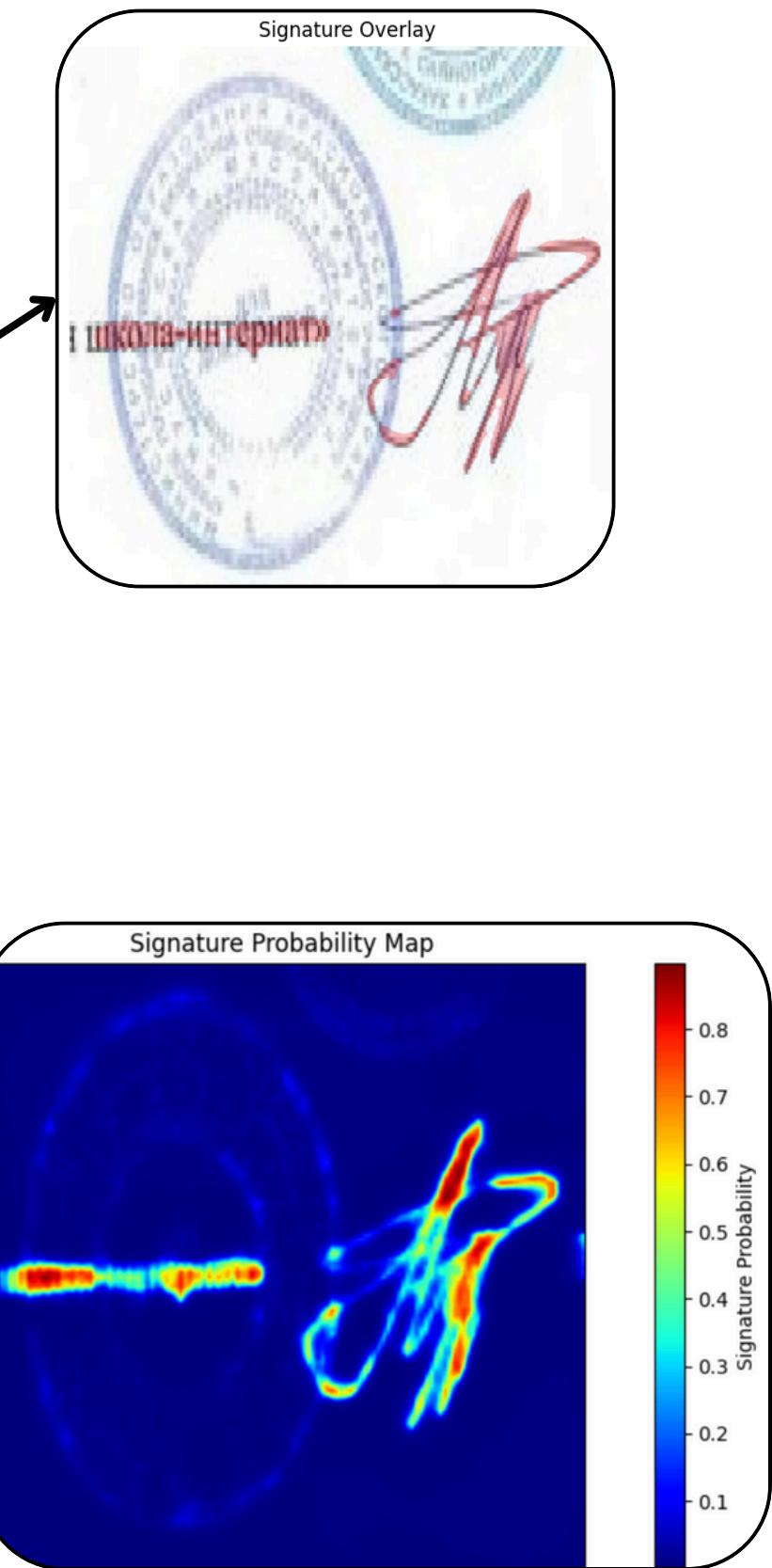
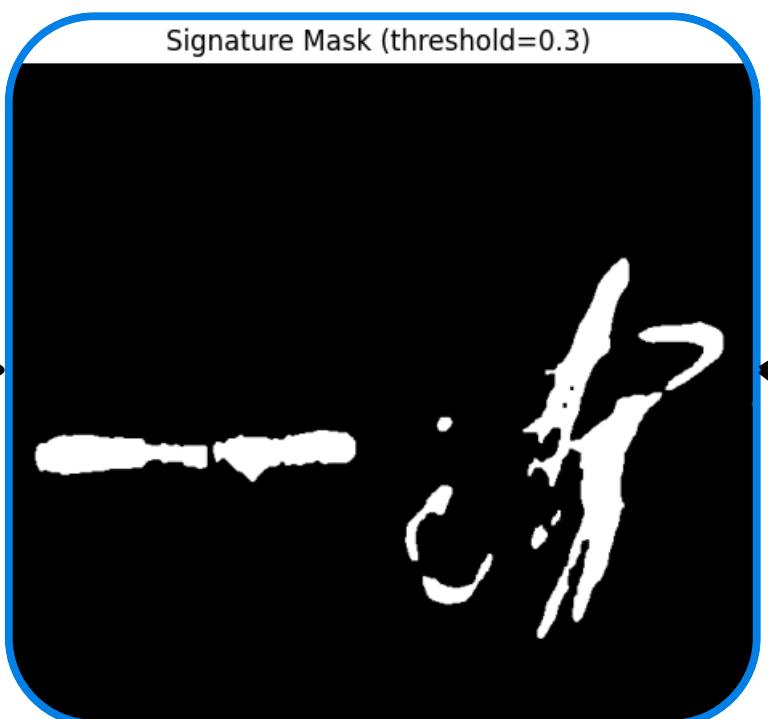


**SegFormer**  
**NVIDIA**  
Simple and Efficient Design  
for Semantic Segmentation  
with Transformers



Input Overlap Image

Input Image → Processed Stamp → Processed Stamp  
minus Segmentation Mask = Final Output



## Masking

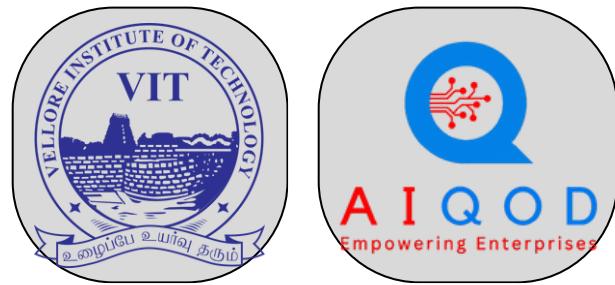


Finegrain Enterprise Company  
<https://finegrain.ai> X finegrain\_ai finegrain-ai



AI at Meta Enterprise Company Verified  
<https://ai.facebook.com/> facebookresearch

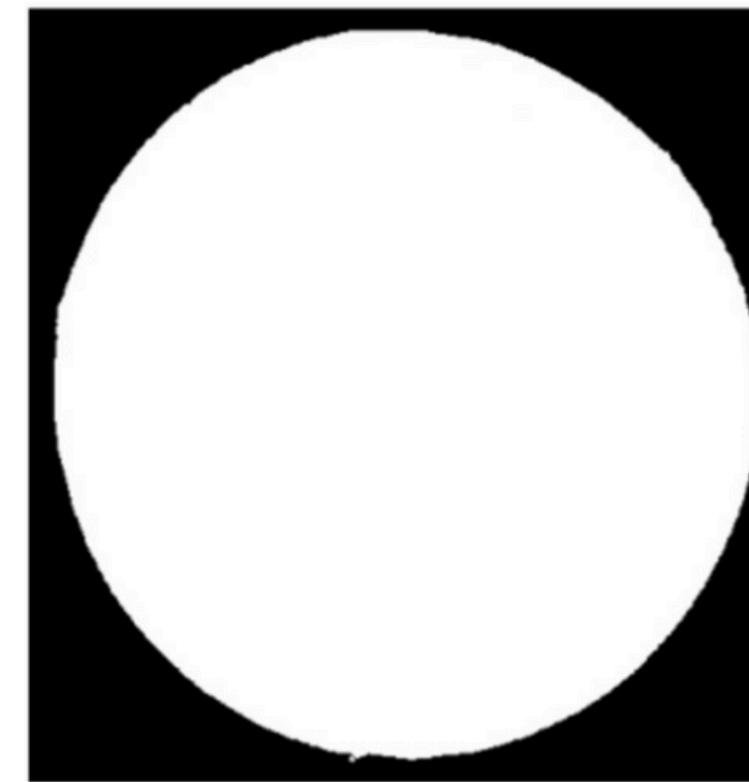
# Preliminary Methodologies



### Stamp Detection

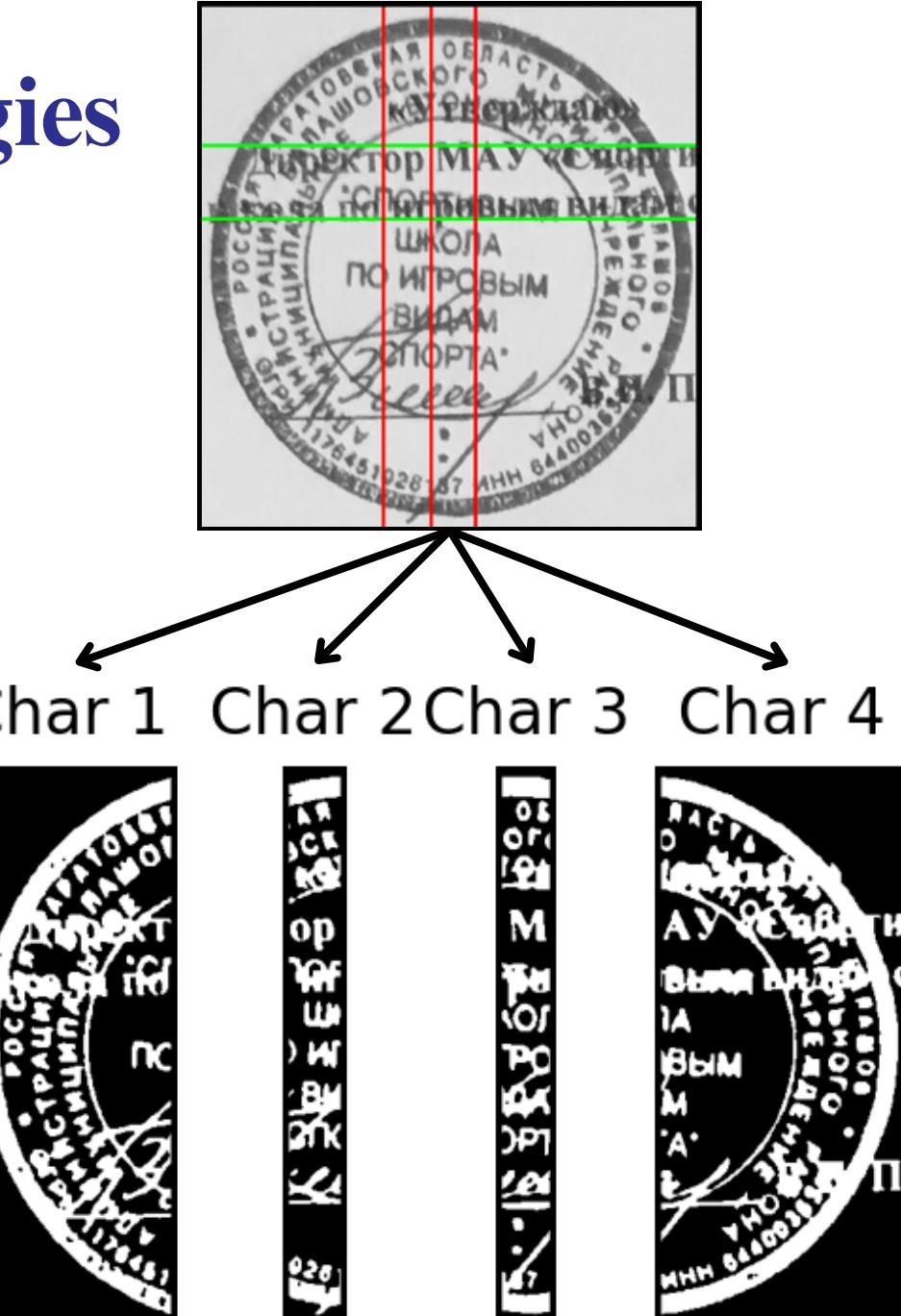
### Background Removal

This lacked the ability to detect and segment Stamps



### Masking

Region of Overlapped Entity  
Due to how Masking works it was only able to segment off the Outer Circle as one entity



**Cursive Overlapped Character Segmentation**  
Using Otsu's algorithm, core-zone detection for improved segmentation of slanted and overlapping words & identifies character boundaries.

Too much noise around the Stamp causes this to not work as intended.

## Segmentation



BRIA AI Enterprise Company  
<https://bria.ai/> X bria\_ai\_ Bria-AI



ZhengPeng7/BiRefNet

## Keypoint Extraction & Feature Extraction



University of Sydney Community  
<https://www.sydney.edu.au/>



facebook/dinov2-base

## Open Source Models

The following models were finetuned to do the specific tasks but without proper data they could not perform the operations



## Input Types



PDF



JPG

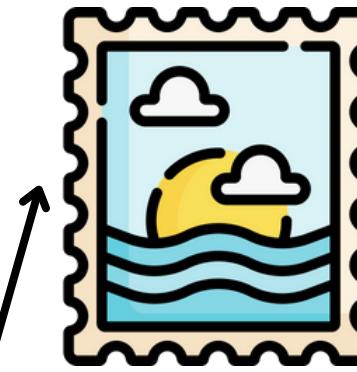


PNG

## Processing Document

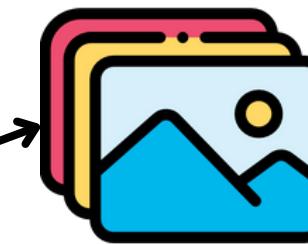


Detection of  
Overlapping  
Entity



Preview  
Mechanic for  
the output  
Images

## Output Types



Conventional  
Image formats



SVG format

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# THANK YOU