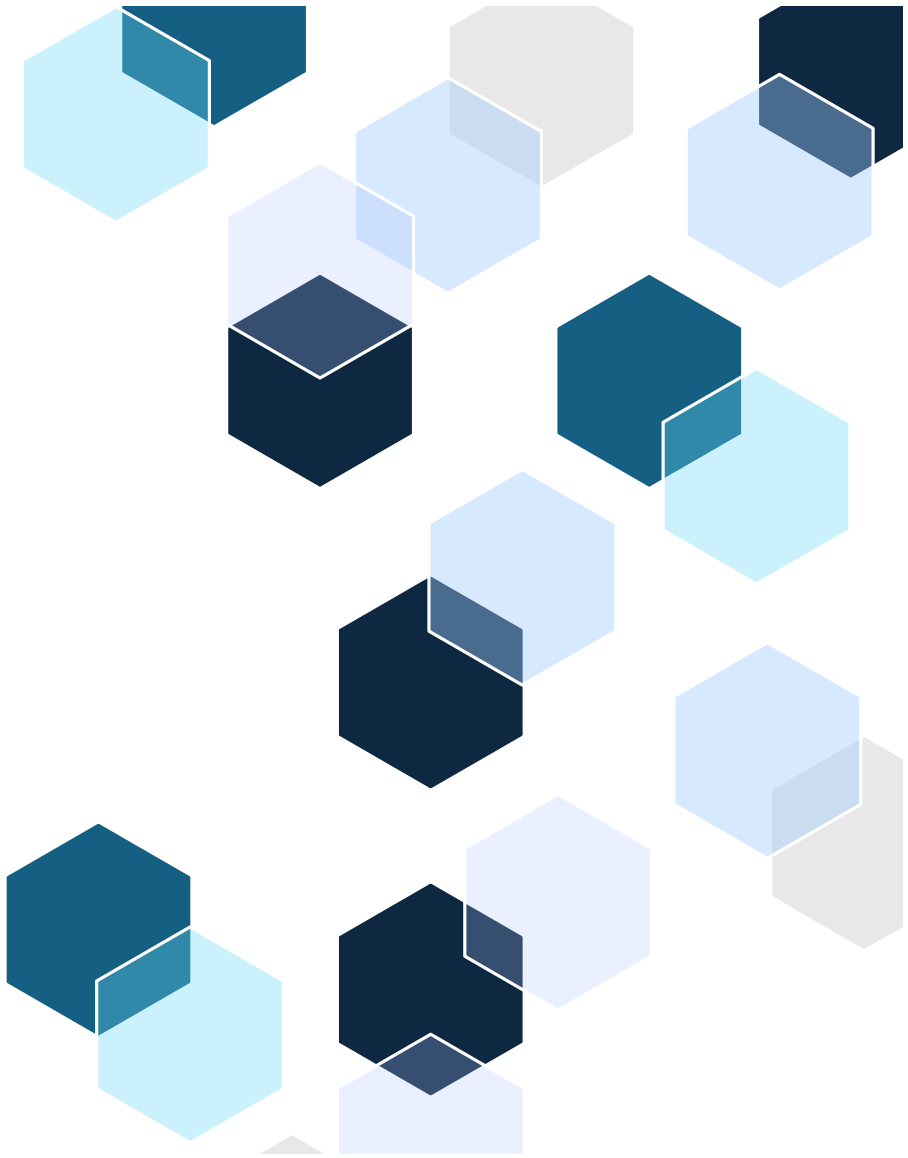
ColonSAM: Semantic 3D Polyp Segmentation with Deep Reinforcement Learning Agent

Mentor: Dr. Tian
Syn Nguyen, Ahnaf Munir





ColonSAM: Semantic 3D Polyp Segmentation with Deep Reinforcement Learning Agent

Background

- Colorectal cancer survival rate: **95%** (stage I and II), **35%** (stage IV and V)
- Highly dependent on physician experience (**22%-28% miss rate**)

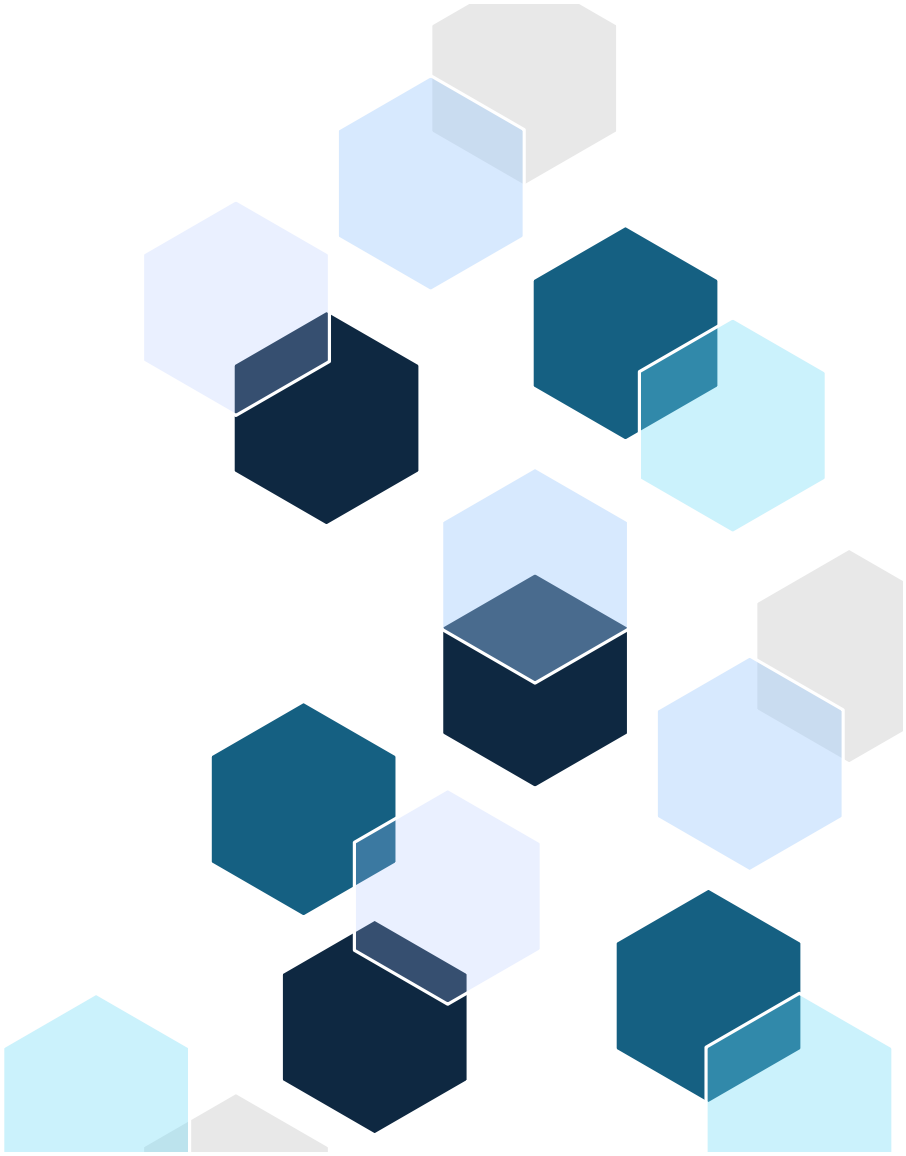


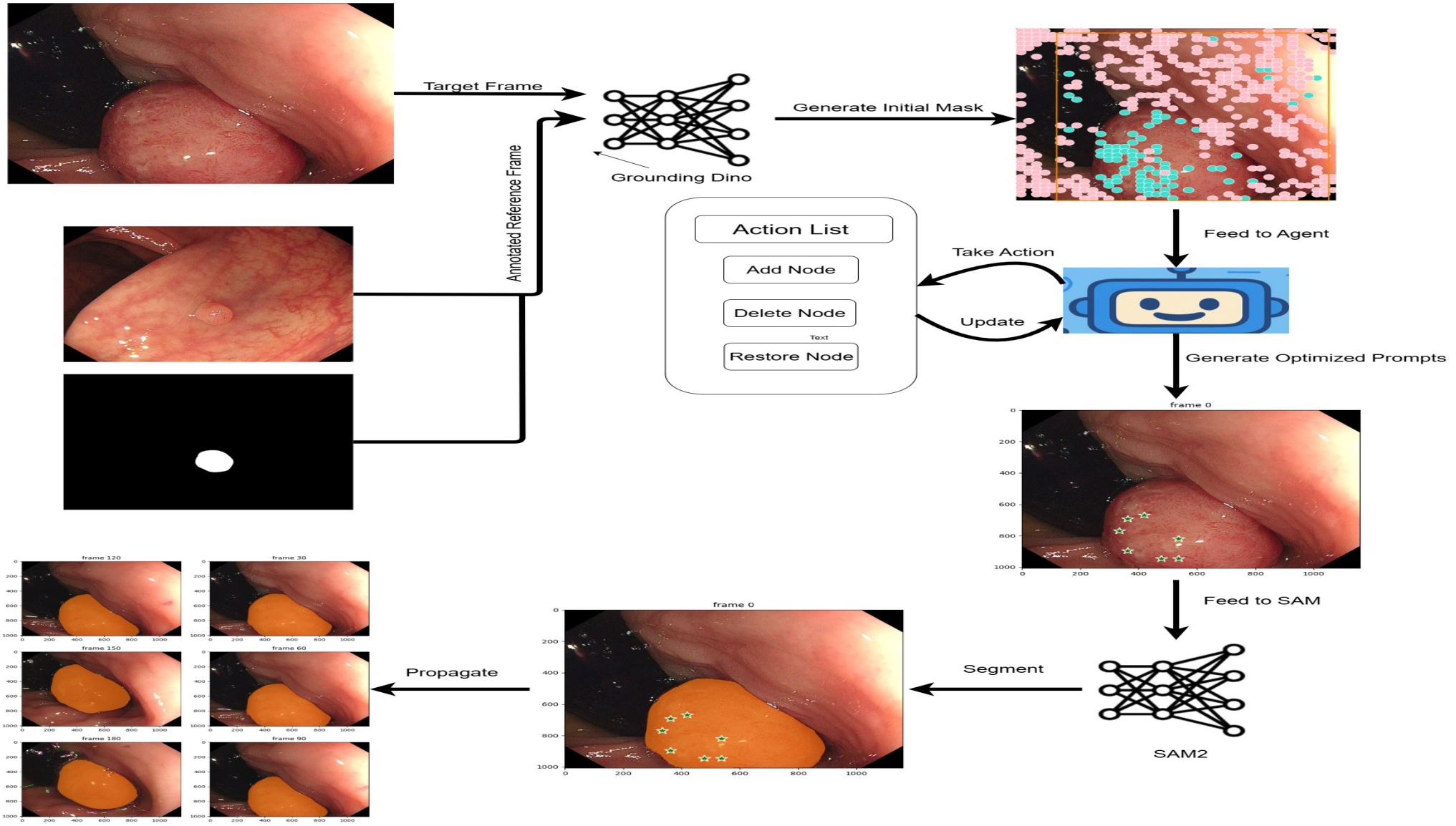
ColonSAM: Semantic 3D Polyp Segmentation with Deep Reinforcement Learning Agent

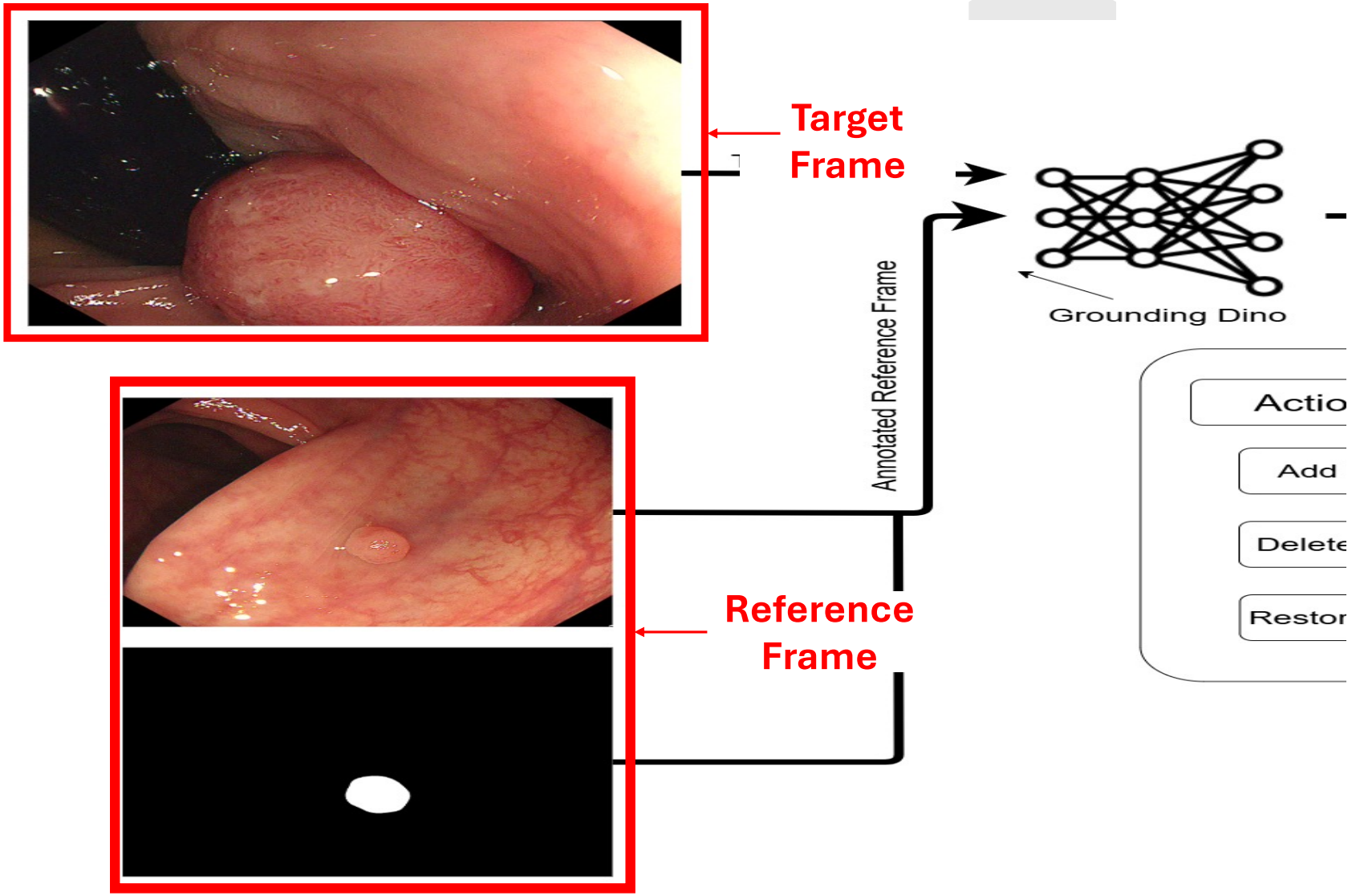
Goal

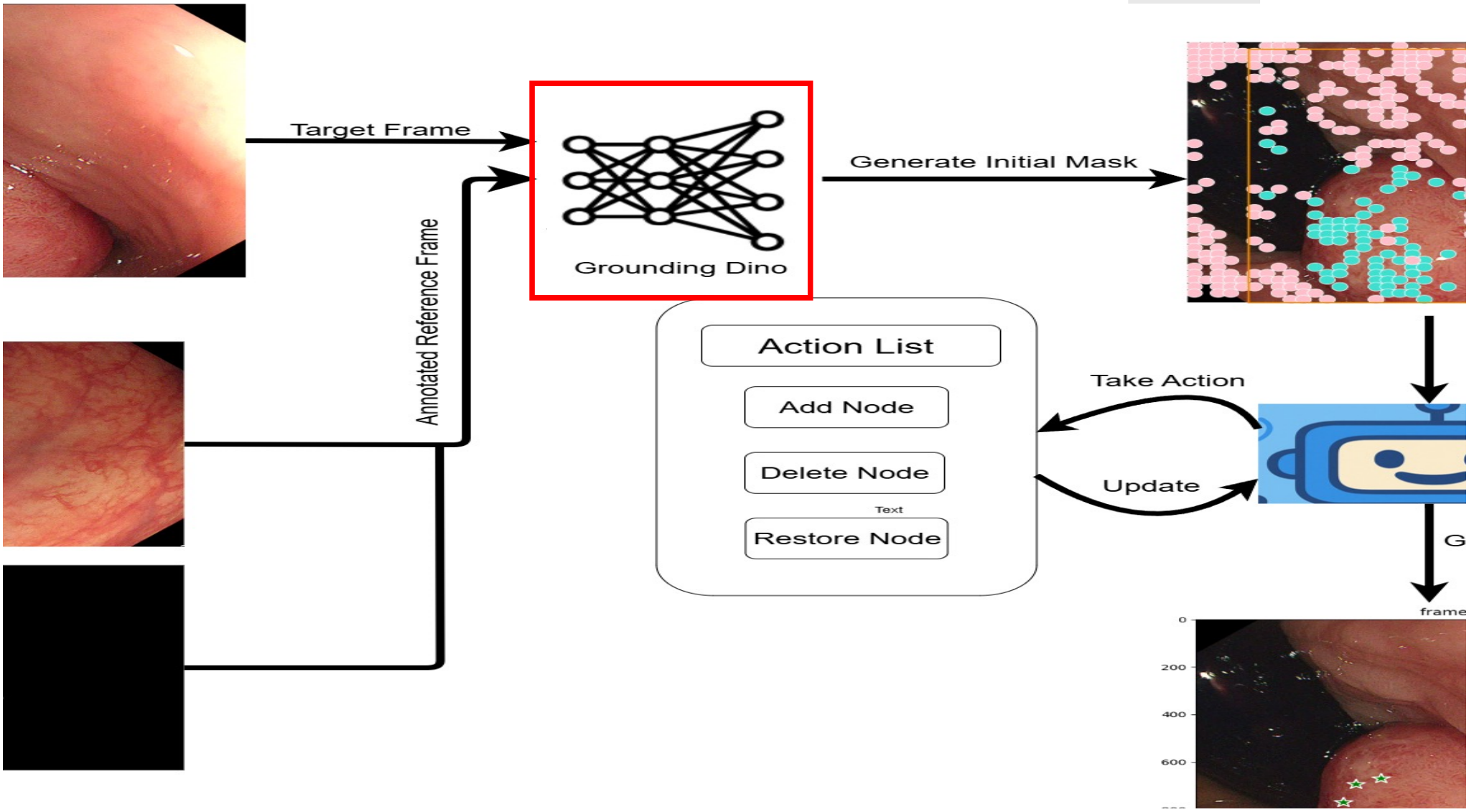
- Develop semantic aware model to segment polyps
- Employ a zero-shot, training-free model using reinforcement learning
- Adapt point optimizer agent on 3D colonoscopy dataset

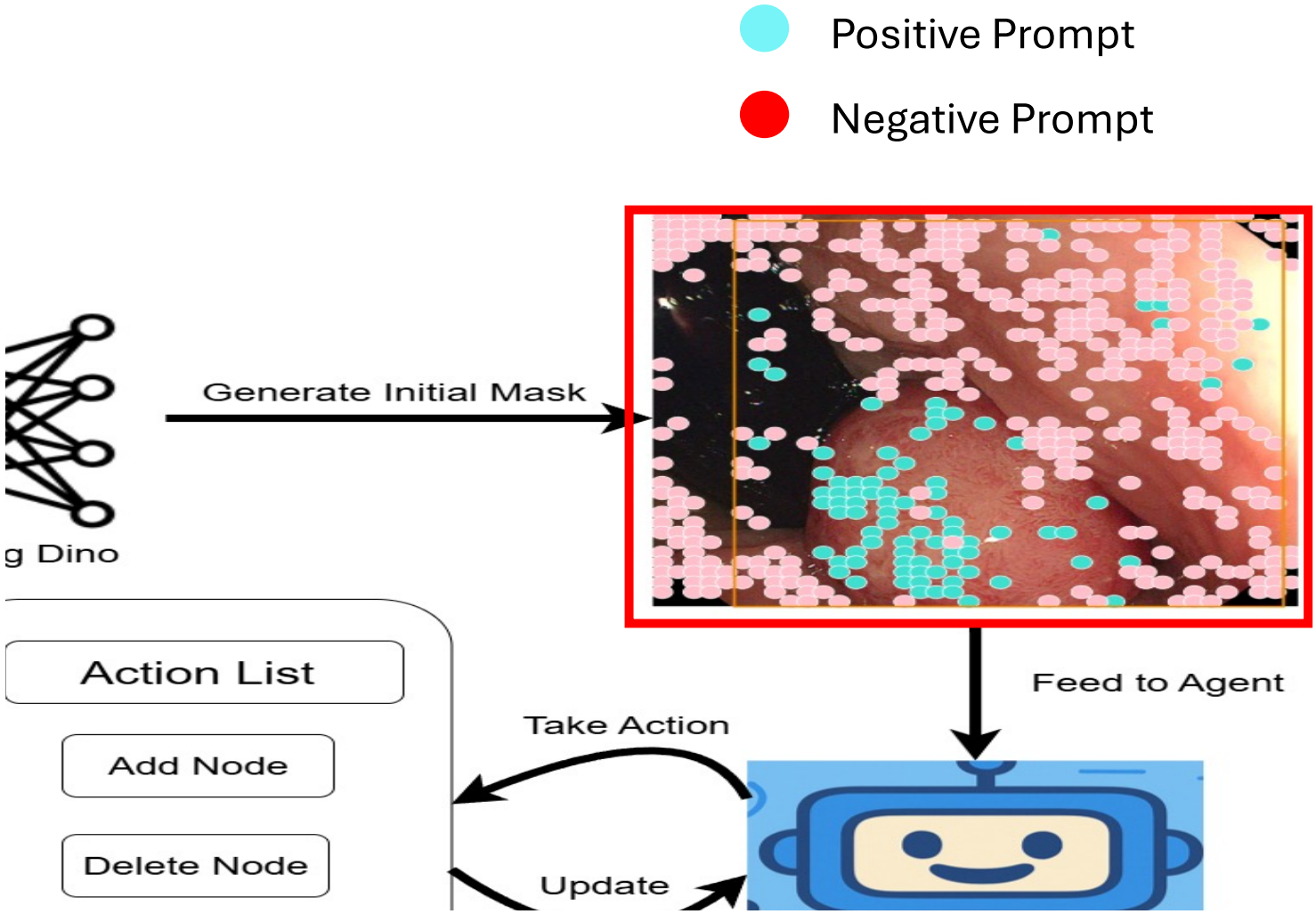
Model

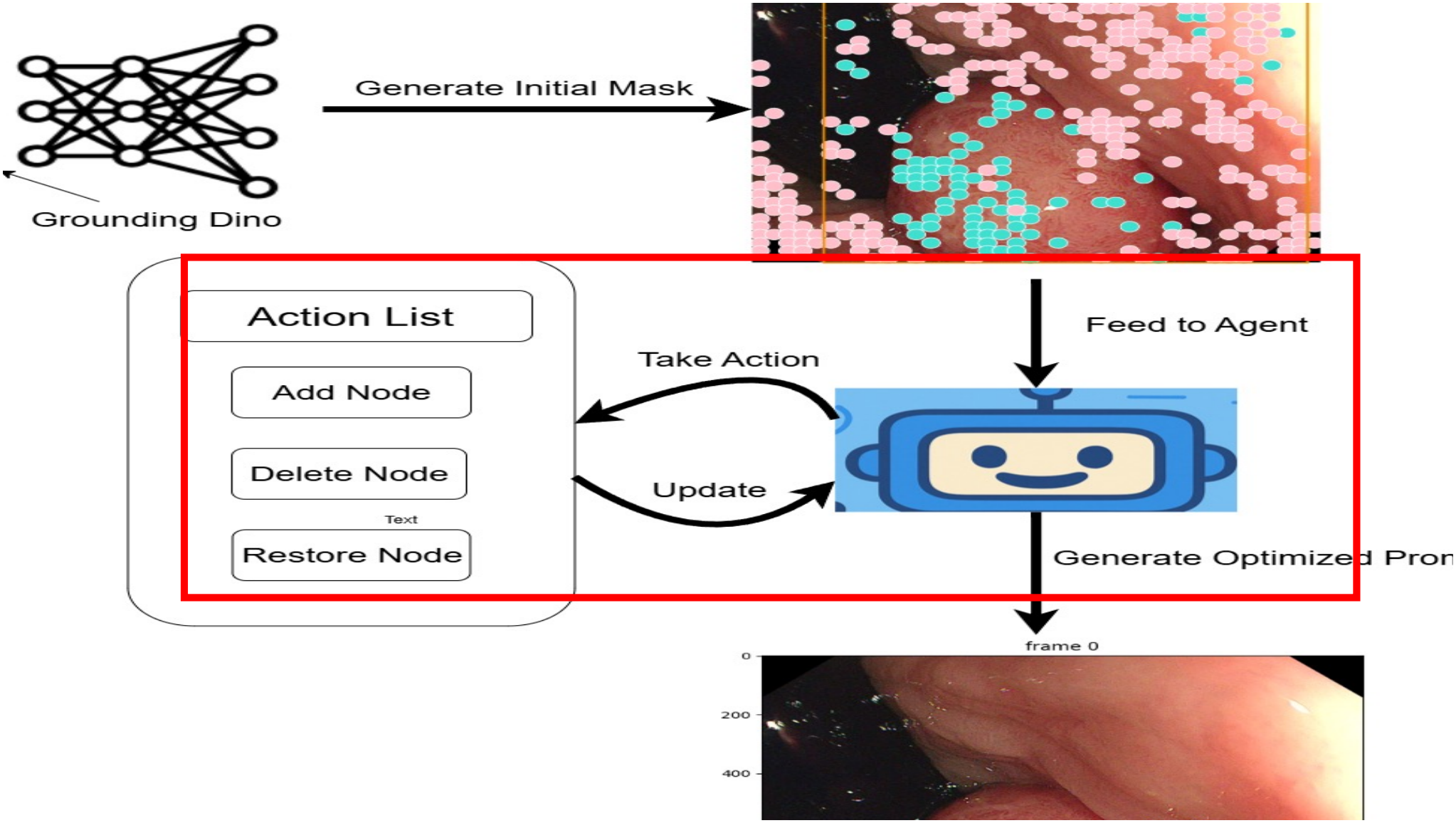


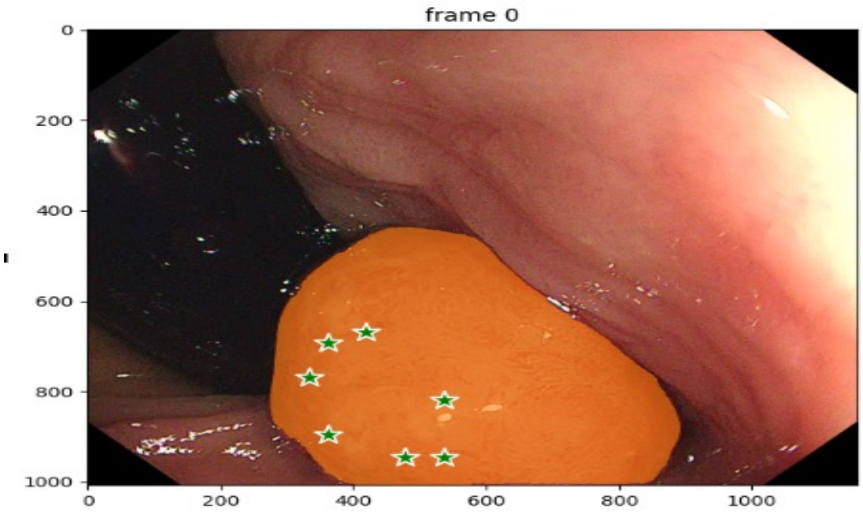

Target Frame
Grounding Dino
Generate Initial Mask
Annotated Reference Frame
Action List
Add Node
Delete Node
Text
Restore Node
Take Action
Update
Feed to Agent
Generate Optimized Prompts
frame 0
Feed to SAM
SAM2
Segment
frame 0
Propagate
frame 120
frame 30
frame 150
frame 60
frame 180
frame 90


Target
Frame
Annotated Reference Frame
Grounding Dino
Reference
Frame
Actio
Add
Delete
Restor

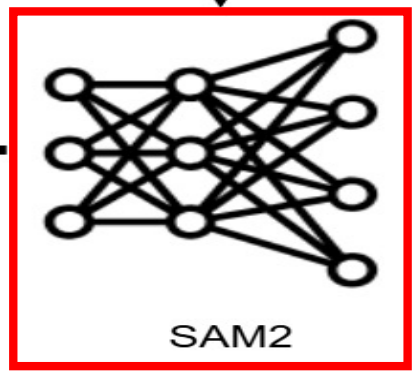

Target Frame
Annotated Reference Frame
Grounding Dino
Generate Initial Mask
Action List
Add Node
Delete Node
Text
Restore Node
Take Action
Update
frame
0
200
400
600


Positive Prompt
Negative Prompt
Generate Initial Mask
g Dino
Action List
Add Node
Delete Node
Take Action
Update
Feed to Agent

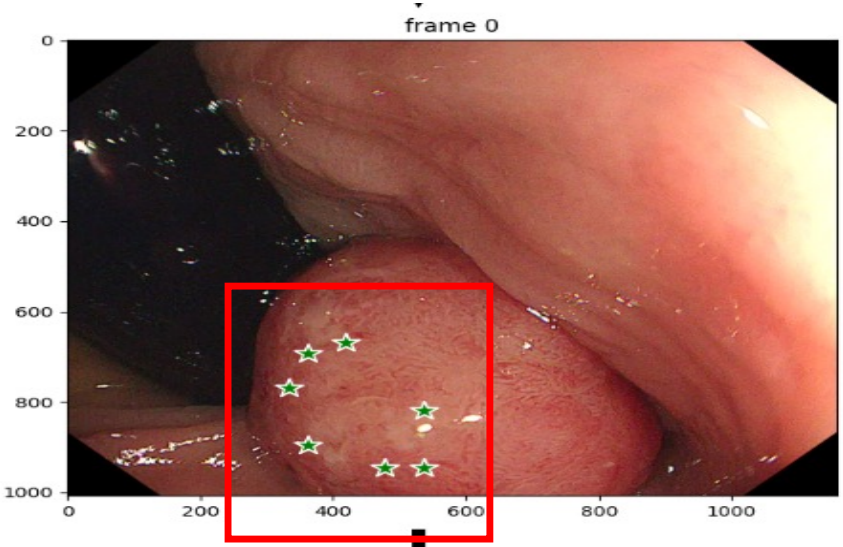

Grounding Dino
Generate Initial Mask
Action List
Add Node
Delete Node
Text
Restore Node
Take Action
Update
Feed to Agent
Generate Optimized Pron
frame 0
0
200
400

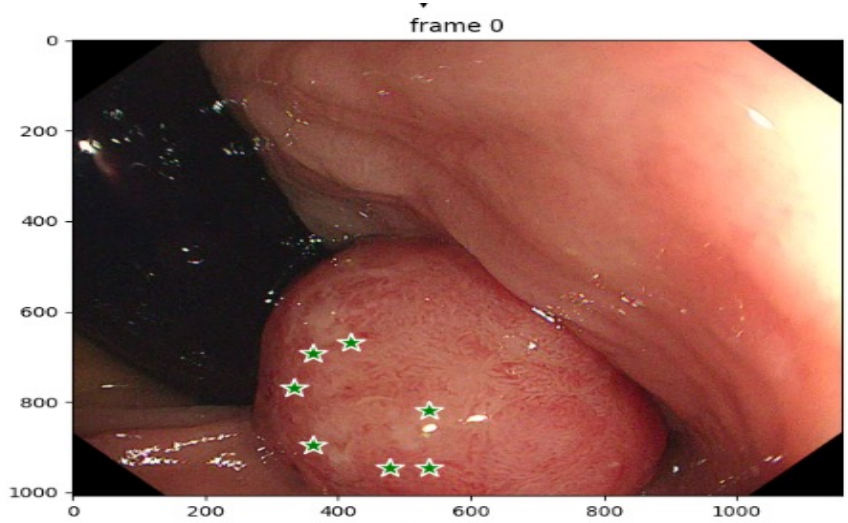


Segment

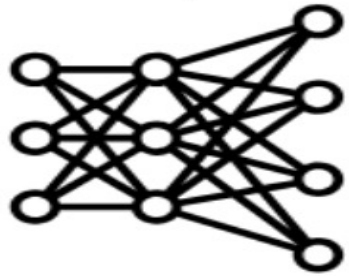


Feed to SAM



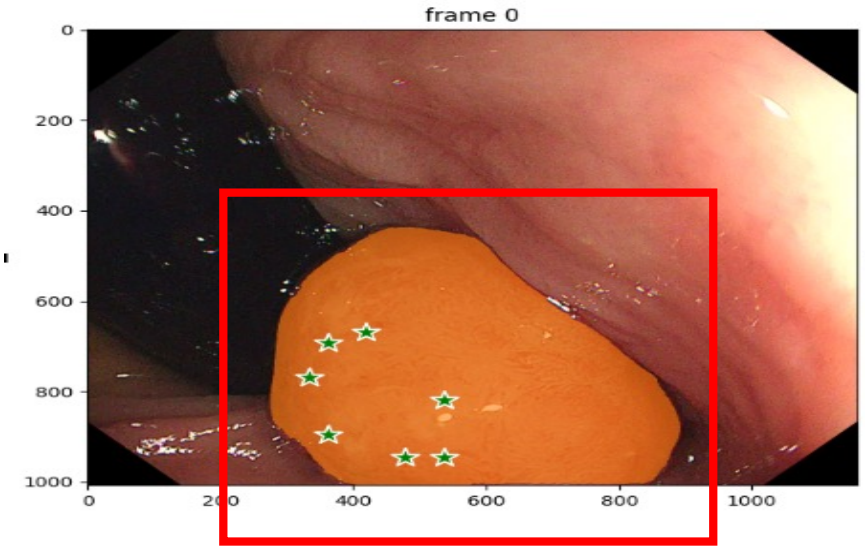


Feed to SAM

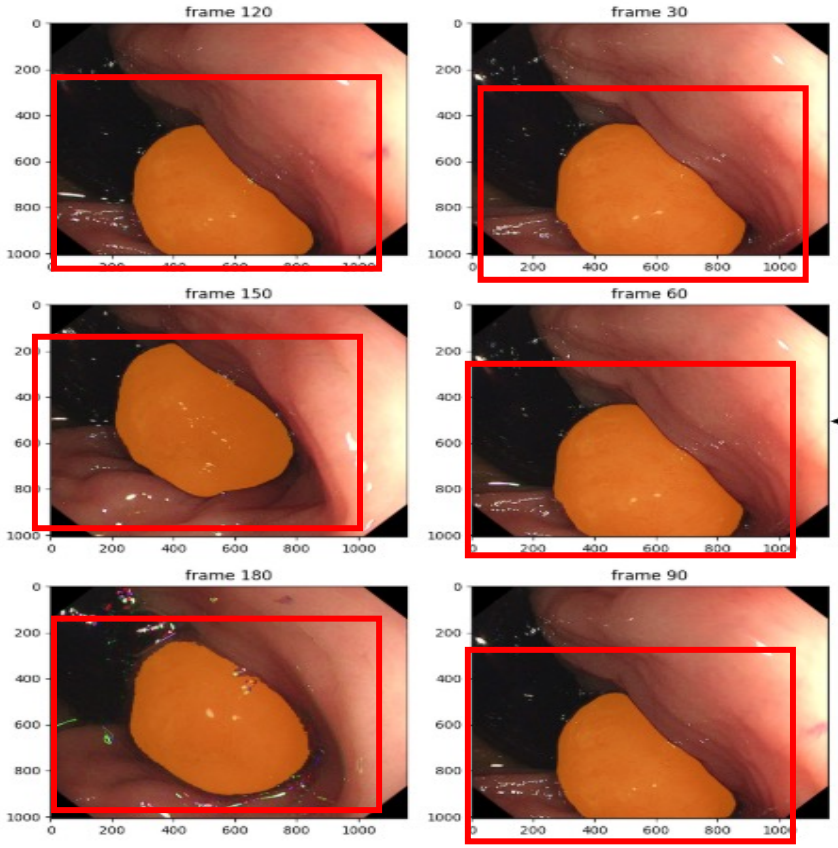


SAM2

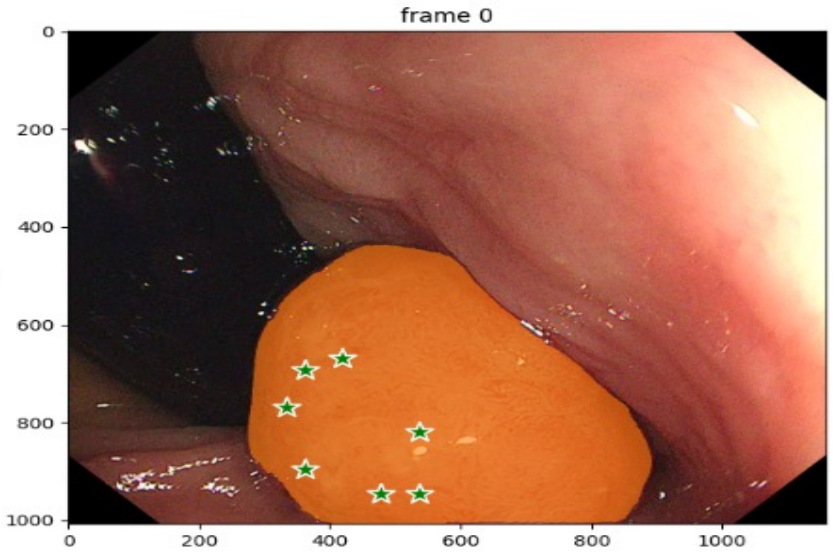
Segment



[redacted]



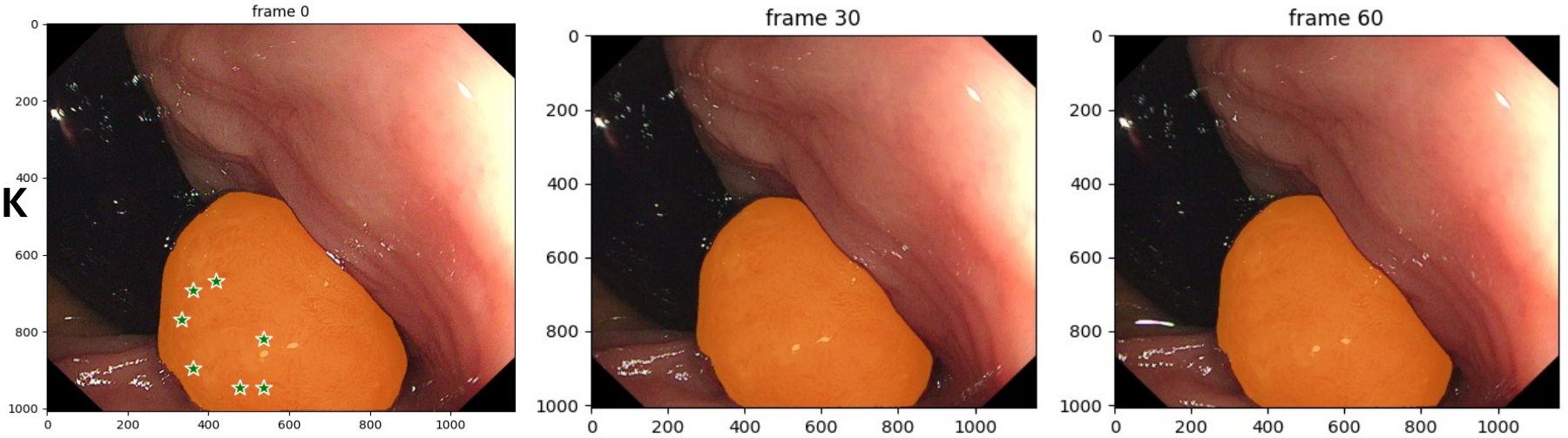
Propagate



Results



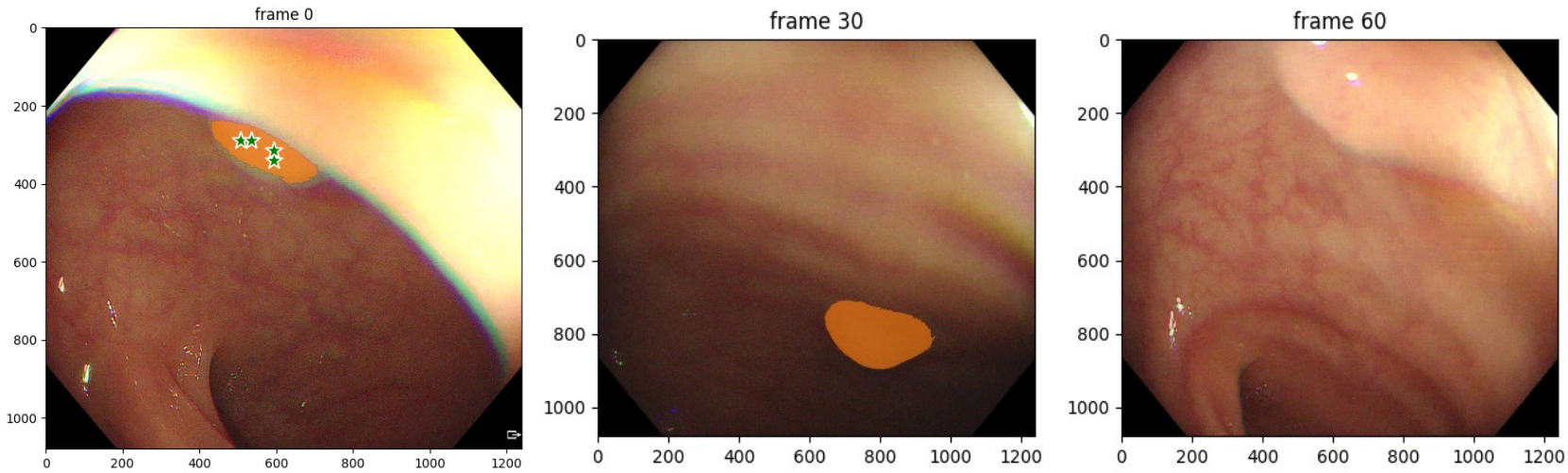
MASK



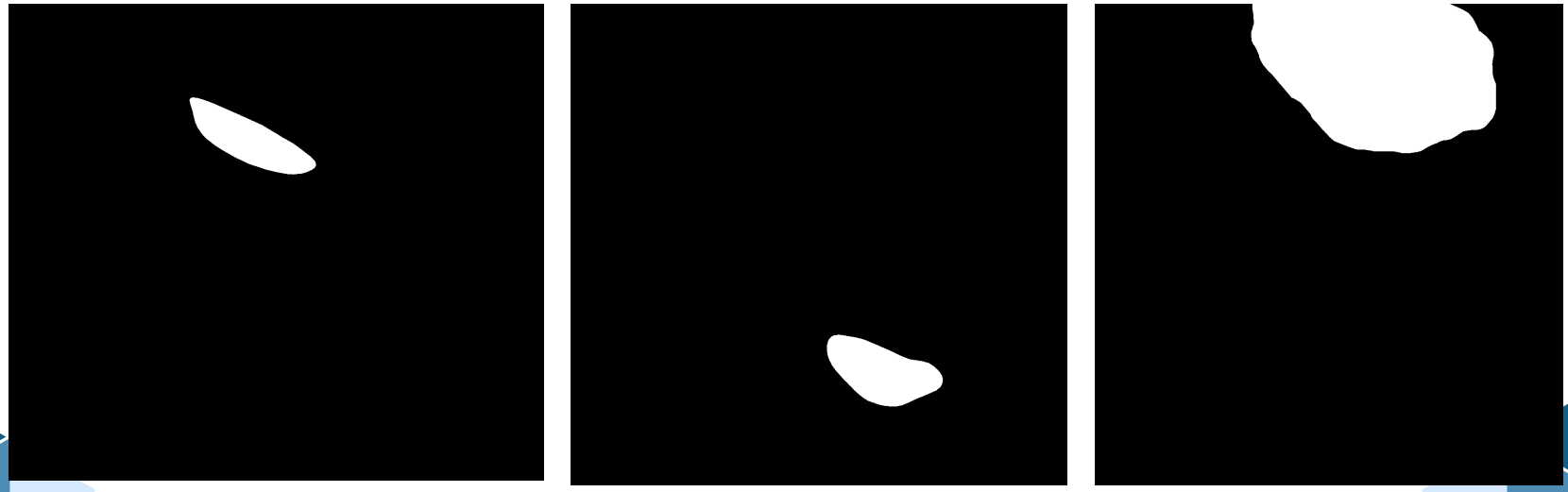
GT



MASK



GT



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THANK YOU!

