

# InstructRestore: Region-Customized Image Restoration with Human Instructions

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## What we want?

Current restoration treats every pixel the same.

But what if users want different effects in different areas?

- For foliage, we may tolerate generative details over strict fidelity.
- For architecture or text, we demand the highest accuracy.
- For background, we might even desire different degree of artistic blur (bokeh).

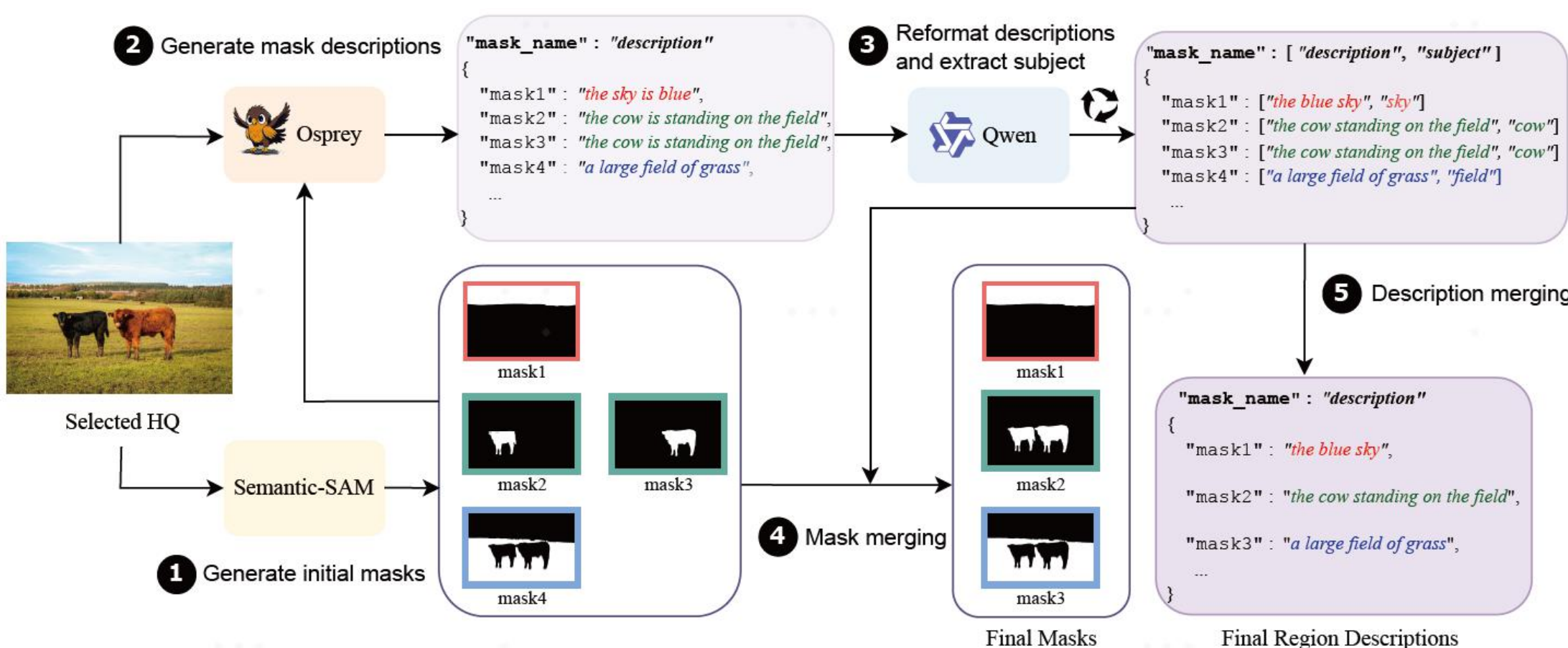
One-size-fits-all? Not anymore.

*Could we command restoration: Where and How Much?*

## Key Challenges

- No large-scale dataset with local annotation suitable for restoration task.
- How to implement continuous controllable local restoration effects with given strength, while keeping the restoration of remaining regions unchanged?

## Data Curation Pipeline

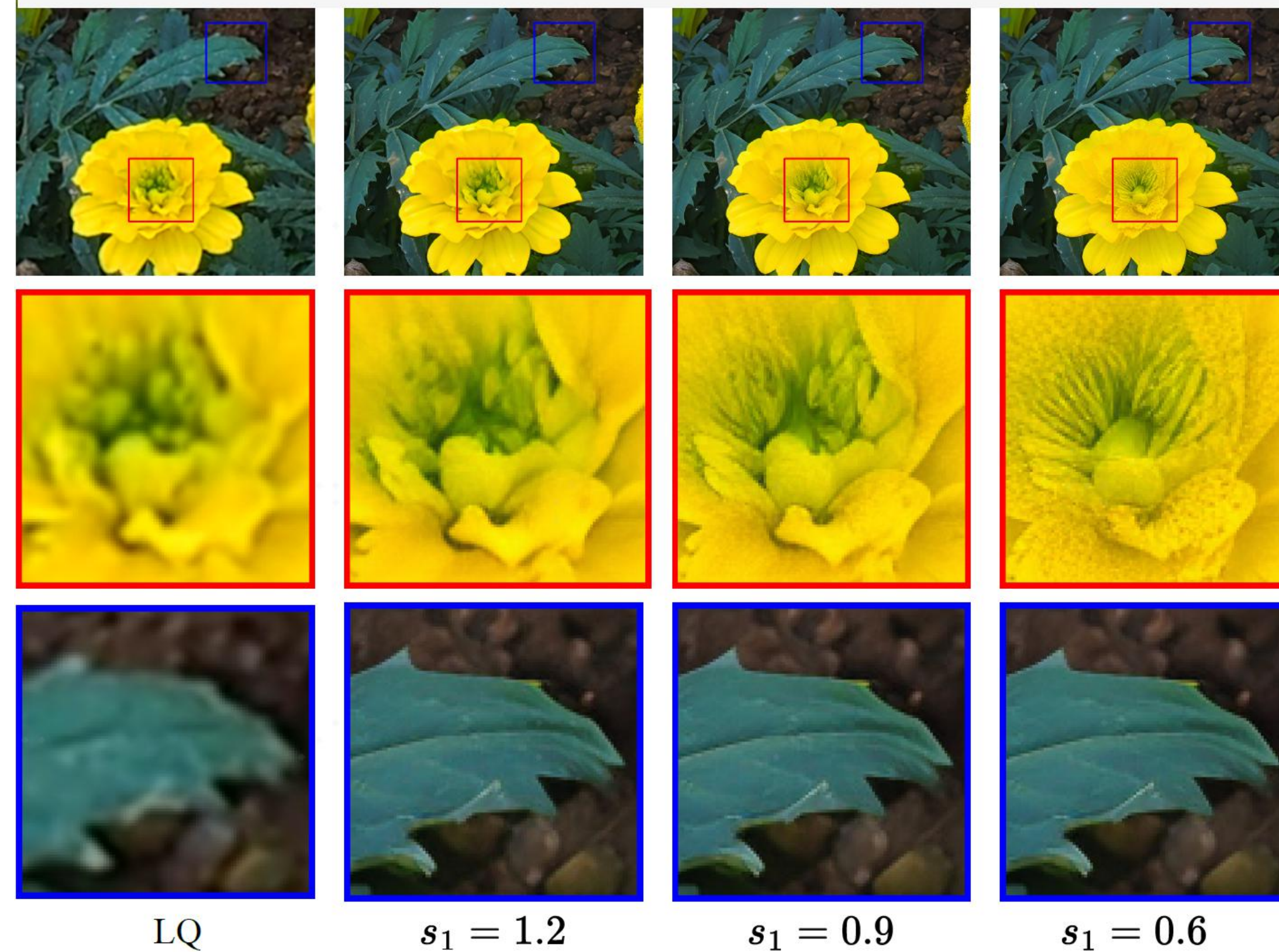


**Tri-IR dataset** with 536,945 triplets of high-resolution GT images, region masks, and descriptive captions.

## What can our method do?

➤ **region-specific restoration with continuous intensity control !**

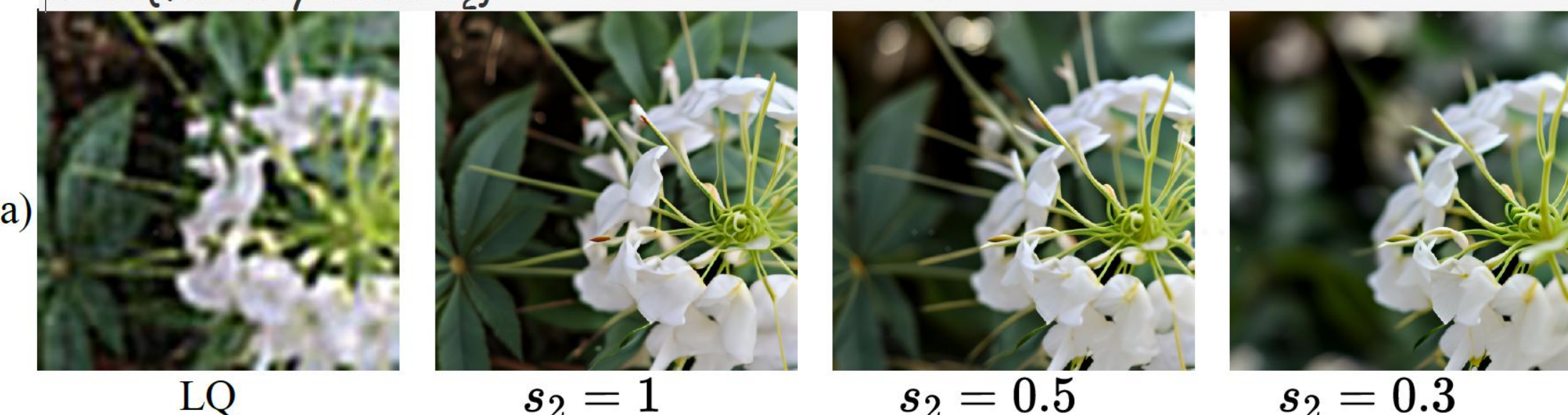
Instruction: "make yellow flower with leaves in the soil clear with { fidelity scale  $s_1$  } and keep other parts clear with 1"



The details in flowers are enhanced gradually while the other regions keeping almost unchanged.

➤ **restoration with controllable bokeh blur effects !**

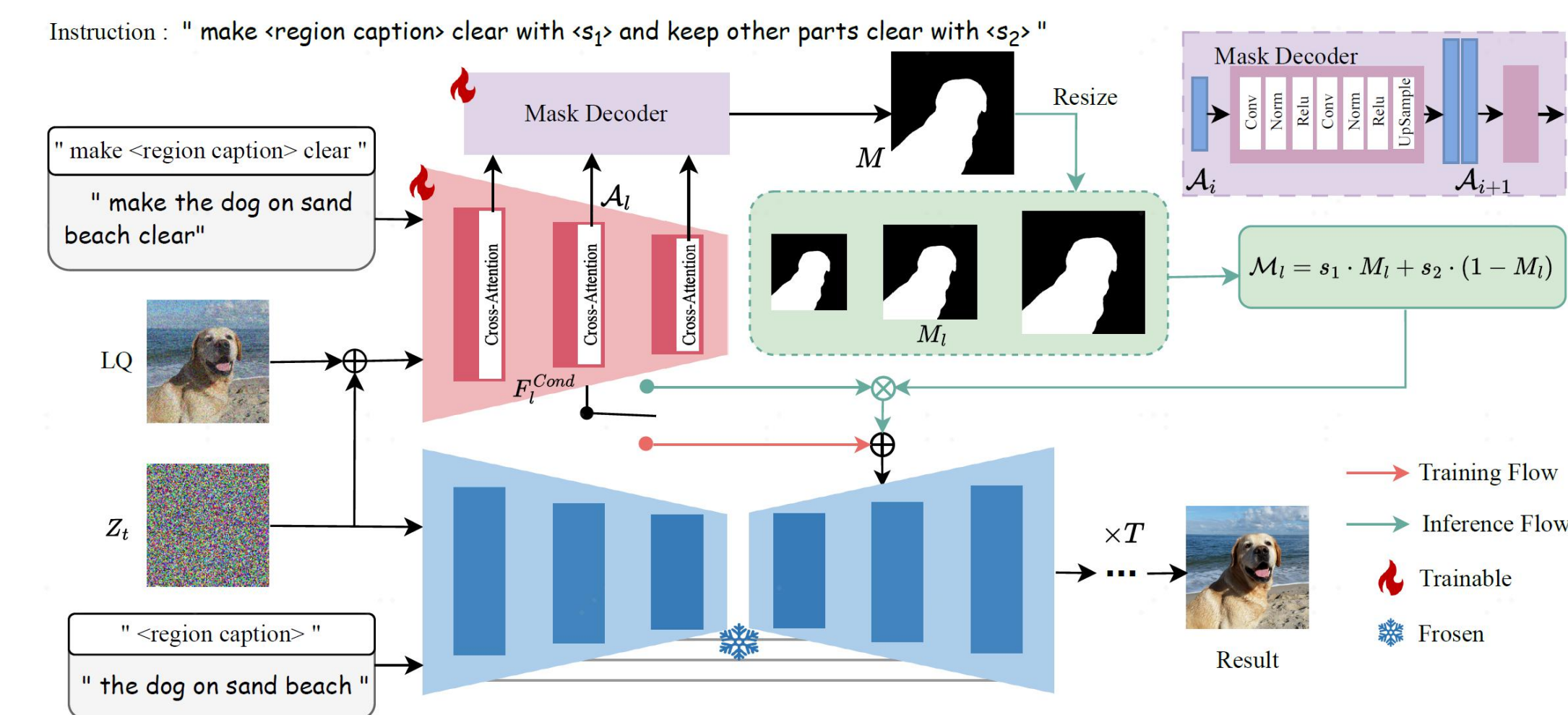
Instruction: "make flower clear with 0.8 and keep other parts bokeh blur with {fidelity scale  $s_2$ }"



Instruction: "make flower clear with {fidelity scale  $s_1$ } and keep other parts bokeh blur with 0.8"



## Framework



## Comparison

- Current global restoration methods fail to preserve the sign with higher fidelity while make the plants more details.



- Current global restoration methods fail to preserve the background bokeh blur while keep the foreground clear with high fidelity.



## Contributions

**The first model achieving region-customized restoration! Especially for the local continuous intensity control and bokeh blur tuning!**