**Why We Design a Plugin for Transforming Images to Arbitrary Scales?**

- Most image super-resolution (SR) methods are specialized for one scale, i.e., different models should be trained for different scales, limiting practical use in real-world applications.
- Why do we not use a single model for arbitrary-scale super-resolution?
- Existing works on arbitrary-scale super-resolution are achieved by a specific network, ignoring the existing powerful SR methods specialized for one scale.
- Why do we not use a simple plugin to augment the ability of powerful SR methods towards Arbitrary Resolution Image Scaling and maintain their original well performance on fixed scale factor?

**Our Contribution:**

- We propose a transformer-based plugin module, called ARIS, which resembles an implicit representation for images and can be inserted into any existing super-resolution models, conveniently augmenting their ability to upsample the image with arbitrary scale;
- We introduce a novel self-supervised training scheme, that exploits consistency constraints to train our ARIS plugin module towards out-of-distribution scales, i.e., LR-HR image pairs are unavailable;
- The ARIS plugin module is orthogonal to the development of new super-resolution architectures, we insert it into several strong models published recently, the resulting models outperform the any-scale super-resolution models on various benchmarks.

**Experimental Results**

HAT-ARIS outperforms all existing arbitrary-scale SR models, for both in and out-distribution scales, validating the effectiveness of ARIS.

The IPT-ARIS, SwinIR-ARIS, and HAT-ARIS achieve comparable performance to their corresponding baseline networks on in-distribution scale factors.

For training the model on out-of-distribution scales beyond the resolution limitation, we adopt a self-supervised training scheme that exploits consistency constraints, which consists of:

- **down-consistency training:** downsample the SR image to the same resolution as available HR image
- **up-consistency training:** upsample the HR image to the same resolution as the SR image