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SMARTSAT Cooperative Research Centre

Diversity is Definitely Needed: Improving Model-Agnostic Zero-shot Classification via Stable Diffusion

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Paper

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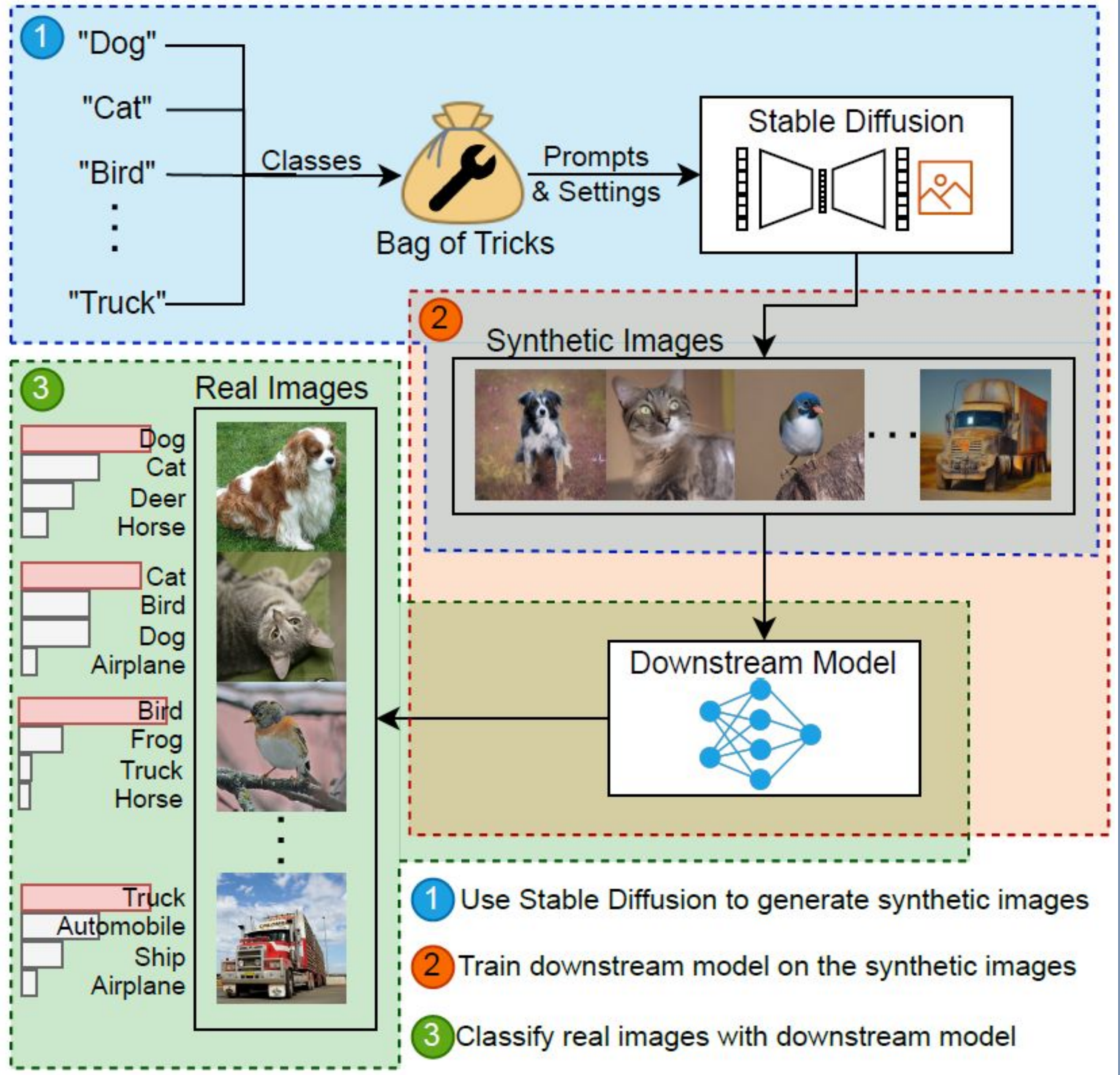
Overview of Method

- How do we solve **M**odel **A**gnostic **Z**ero-**S**hot **C**lassification?
- Use **stable diffusion** to generate **synthetic training data** to train **downstream models**.
- The performance of real data is dependent on the **diversity** of the synthetic images used for training.
- **Enhance** the **diversity** of the synthetic training data with **adjustments** to the **prompts** and generation **settings** used.



GitHub Code

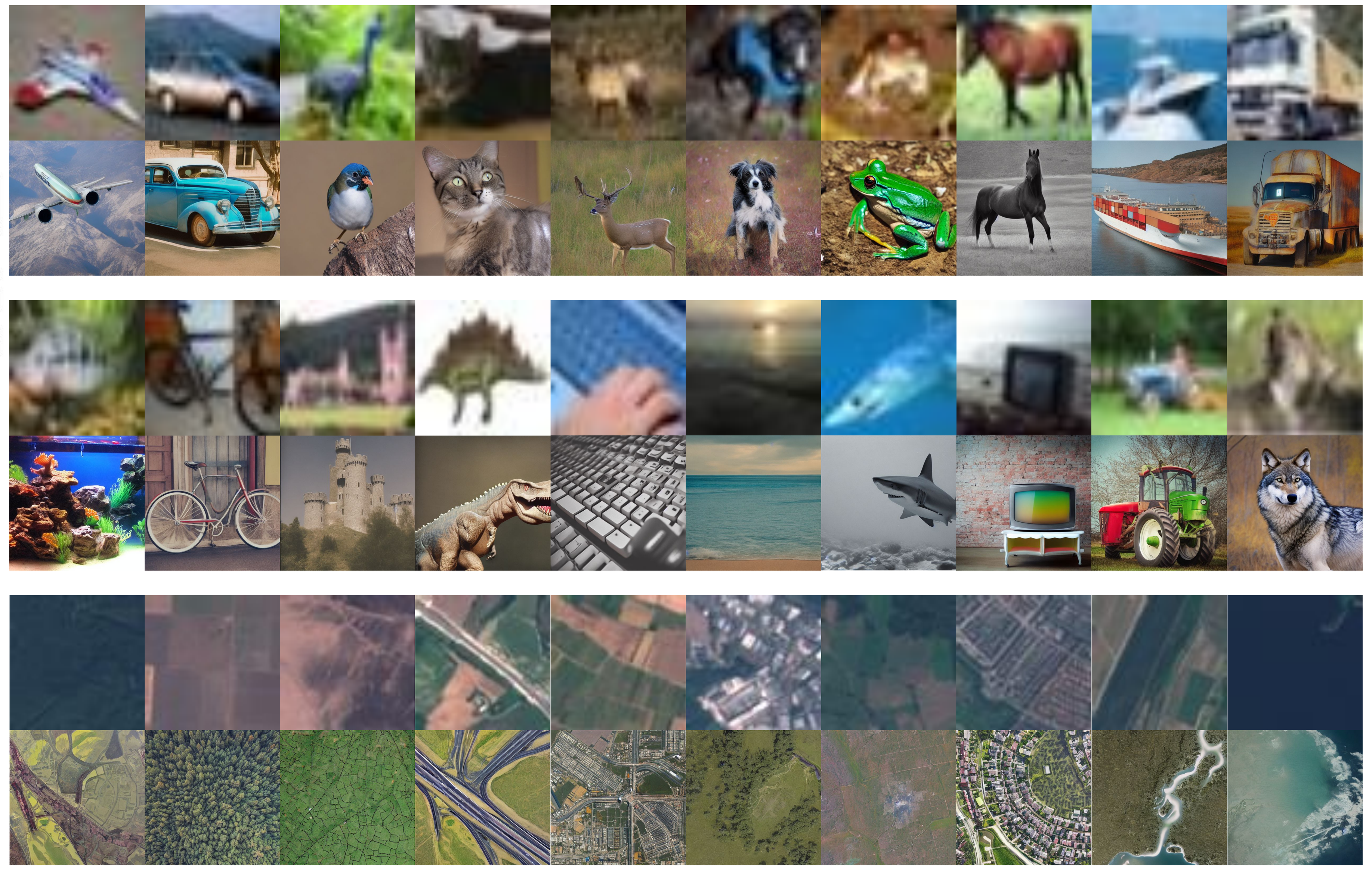
Real (top) vs Synthetic (bottom) Datasets

CIFAR10

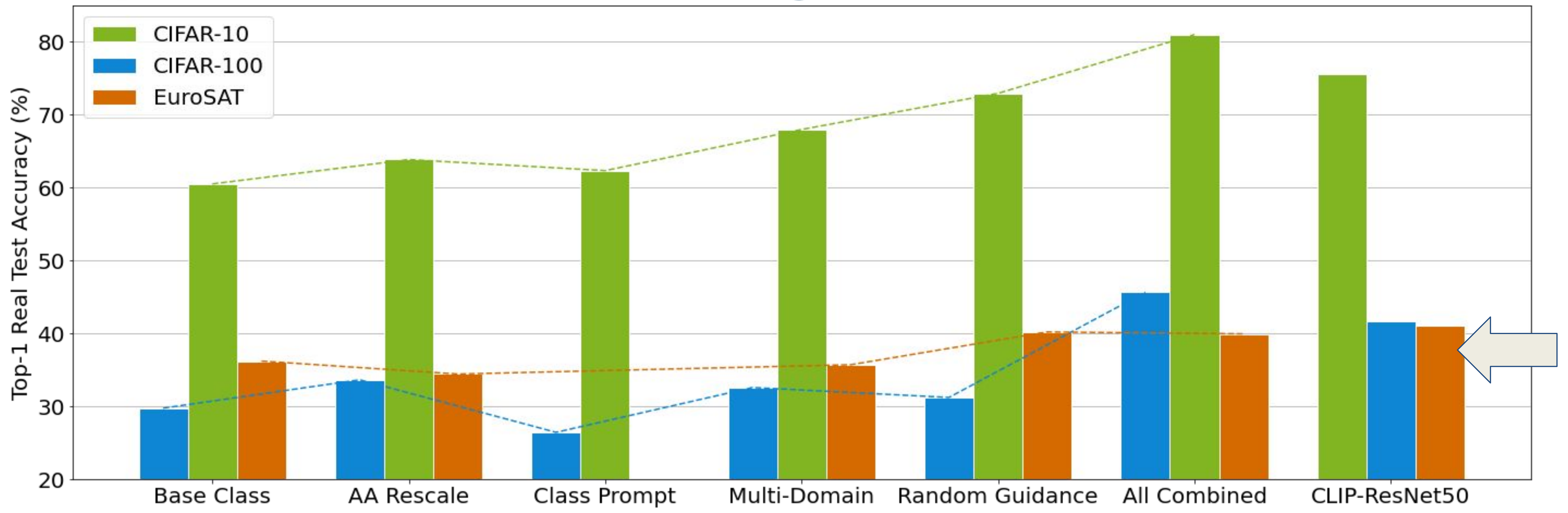
Download

CIFAR100

EuroSAT

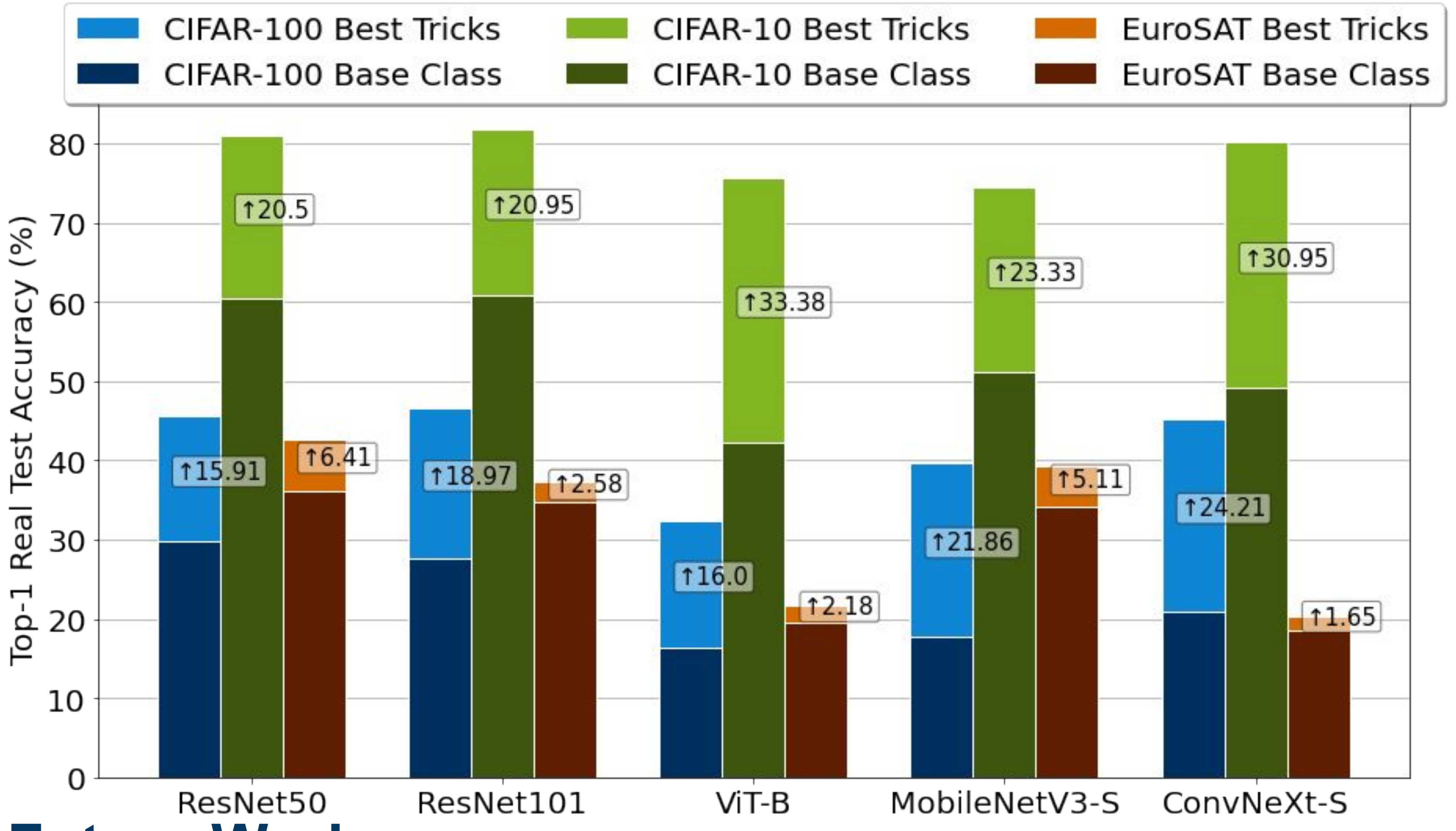


Improvement from Bag of Tricks



CLIP Zero-shot Baseline [2]

Improvement with Different Models



Future Work

- More datasets, such as ImageNet and domain specific datasets, such as additional remote sensing datasets/medical datasets.
- Making the method more efficient through reducing the number of training images needed.
- Expanding to other computer vision tasks, such as semantic segmentation and object detection.

Bag of Tricks

Base Class: "An image of a {class}"
Class Prompt: "{class}"
Multi-Domain: "a {domain} of a {class}"
Random Guidance: "An image of a {class}" + random unconditional guidance [1] value set between 1-5

Base Class

Class Prompt

Multi-Domain

Random Guidance

Questions?

Join our Zoom call during the poster session or email us a question.

Meeting ID: 926 453 9384
Email: jordan.shipard@hdr.qut.edu.au

Zoom link

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Citations

[1] "Classifier-free diffusion guidance", Jonathan Ho and Tim Salimans, NIPS 2021
[2] "Learning Transferable Visual Models From Natural Language Supervision", Radford et al., ICML 2021