IIRC: Incremental Implicitly Refined Classification

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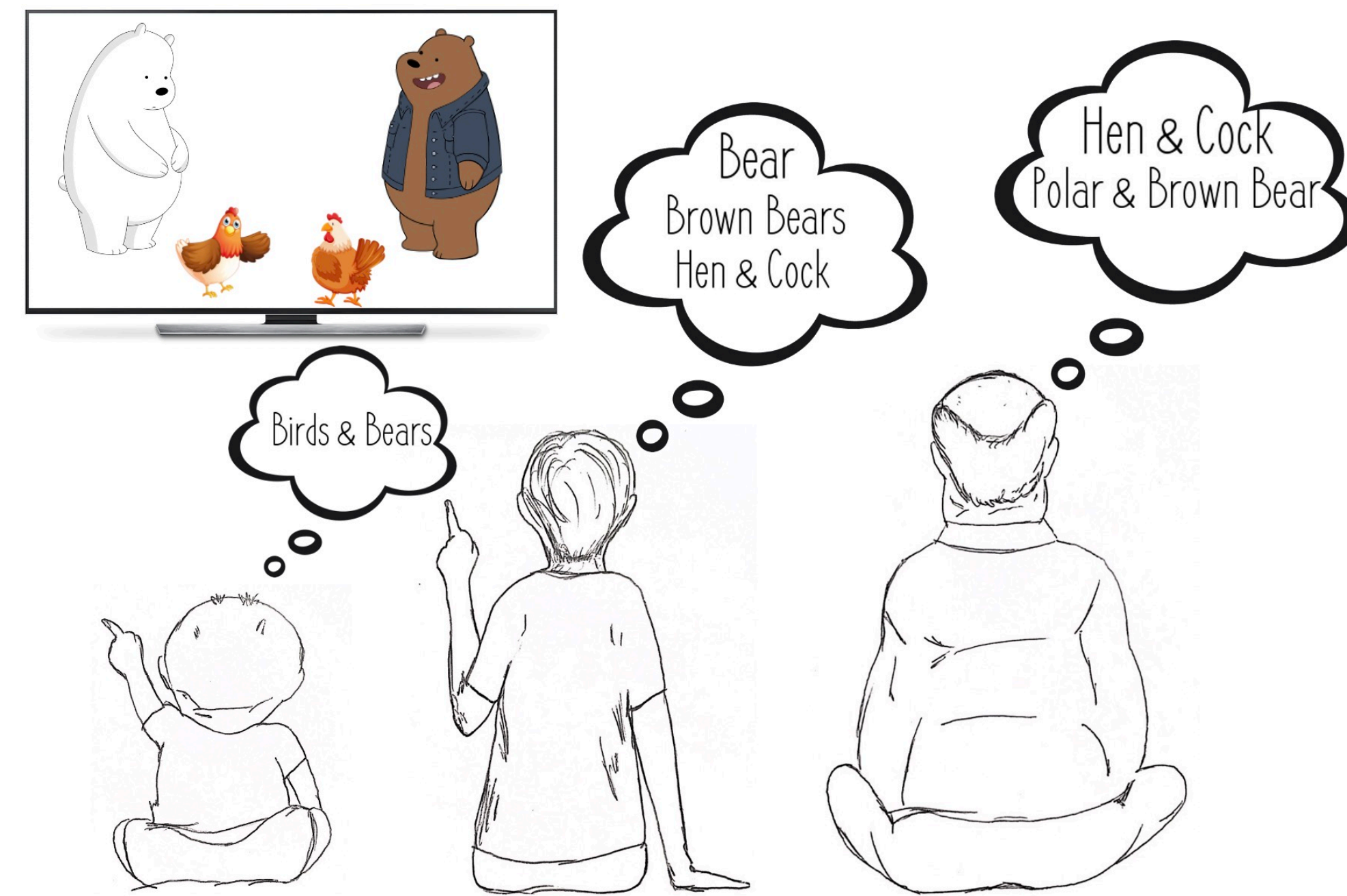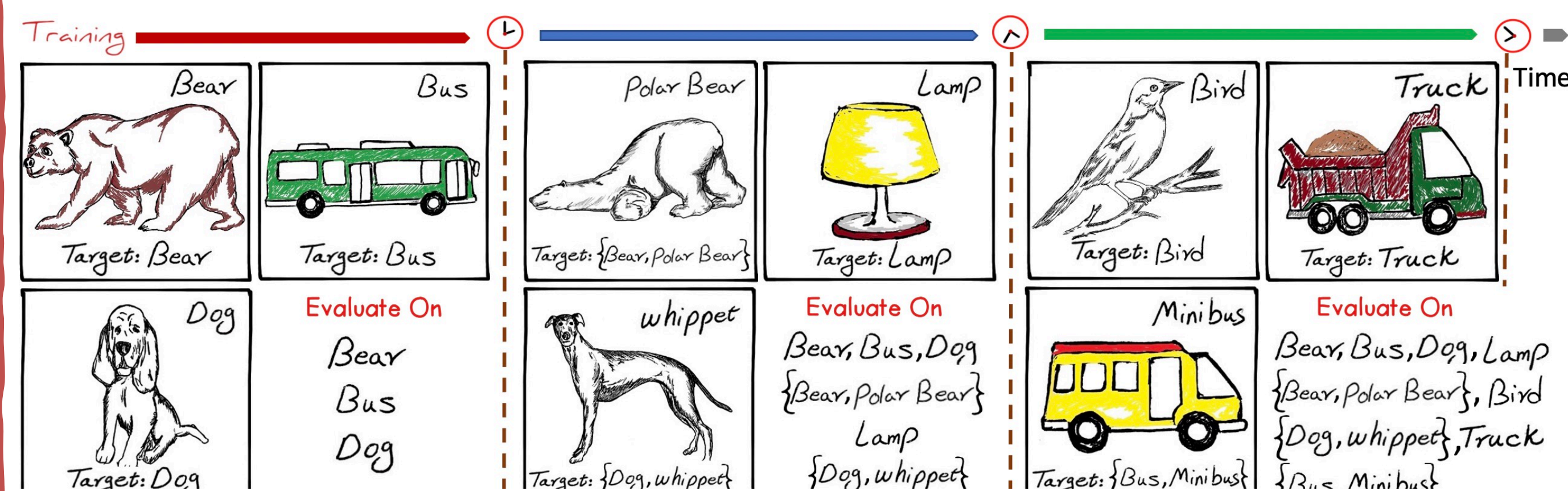
https://chandar-lab.github.io/IIRC/

1. Introduction

AI models should be able to accumulate knowledge over time, learn new concepts, and modify existing ones. Moreover, when faced with conflicting or missing information, they should be able to use their existing knowledge to solve any ambiguity and detect the missing pieces.
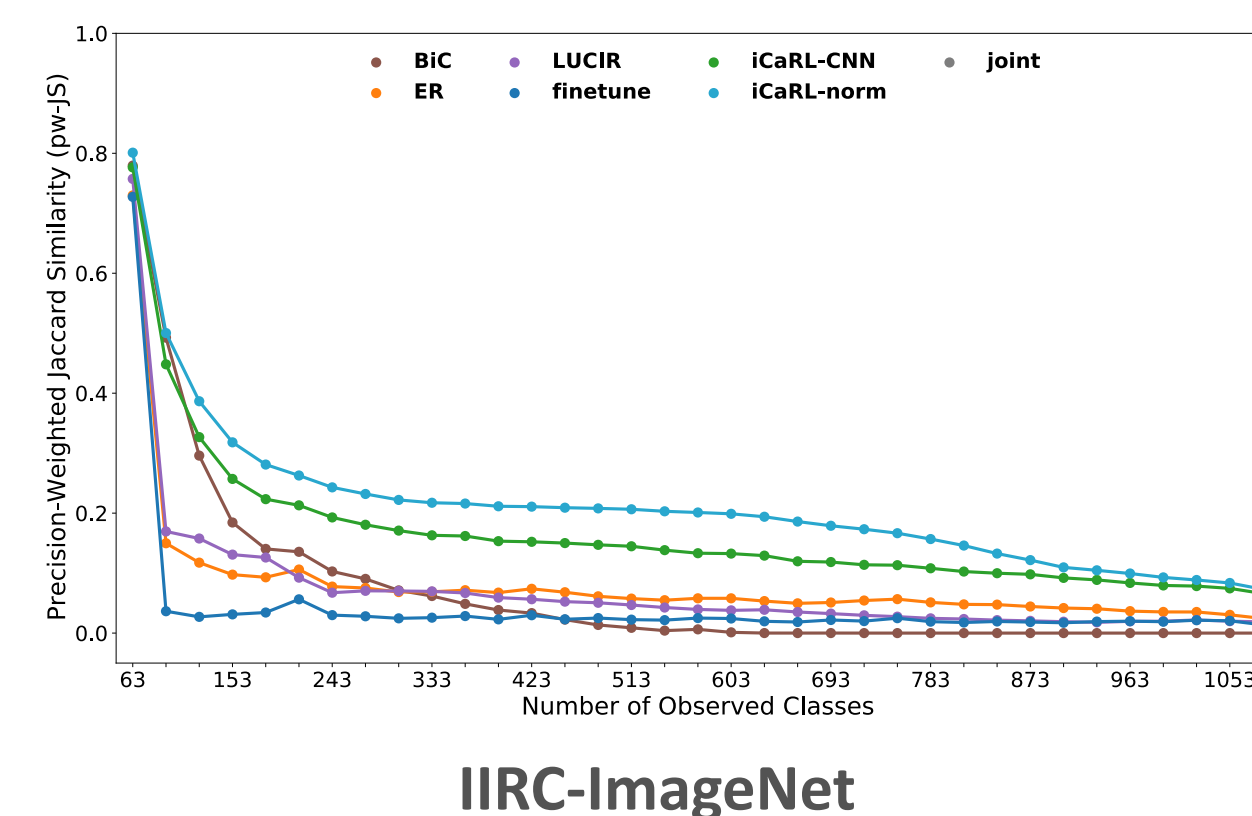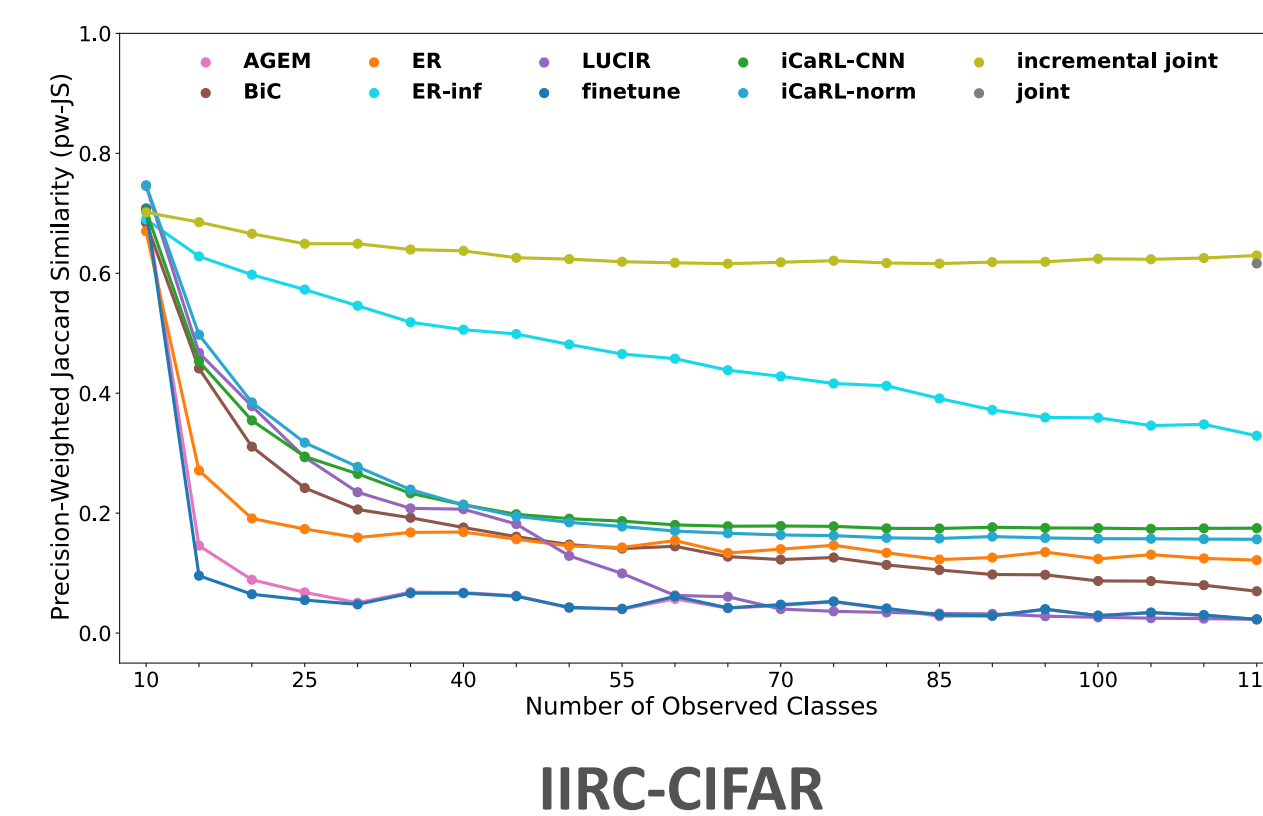

2. IIRC Setup

IIRC setup is an extension to the class incremental setup, where some of the classes across tasks are related in a superclass-subclass relationship, but only the label that belongs to the current task are provided during training. A superclass is introduced before its constituent subclasses.
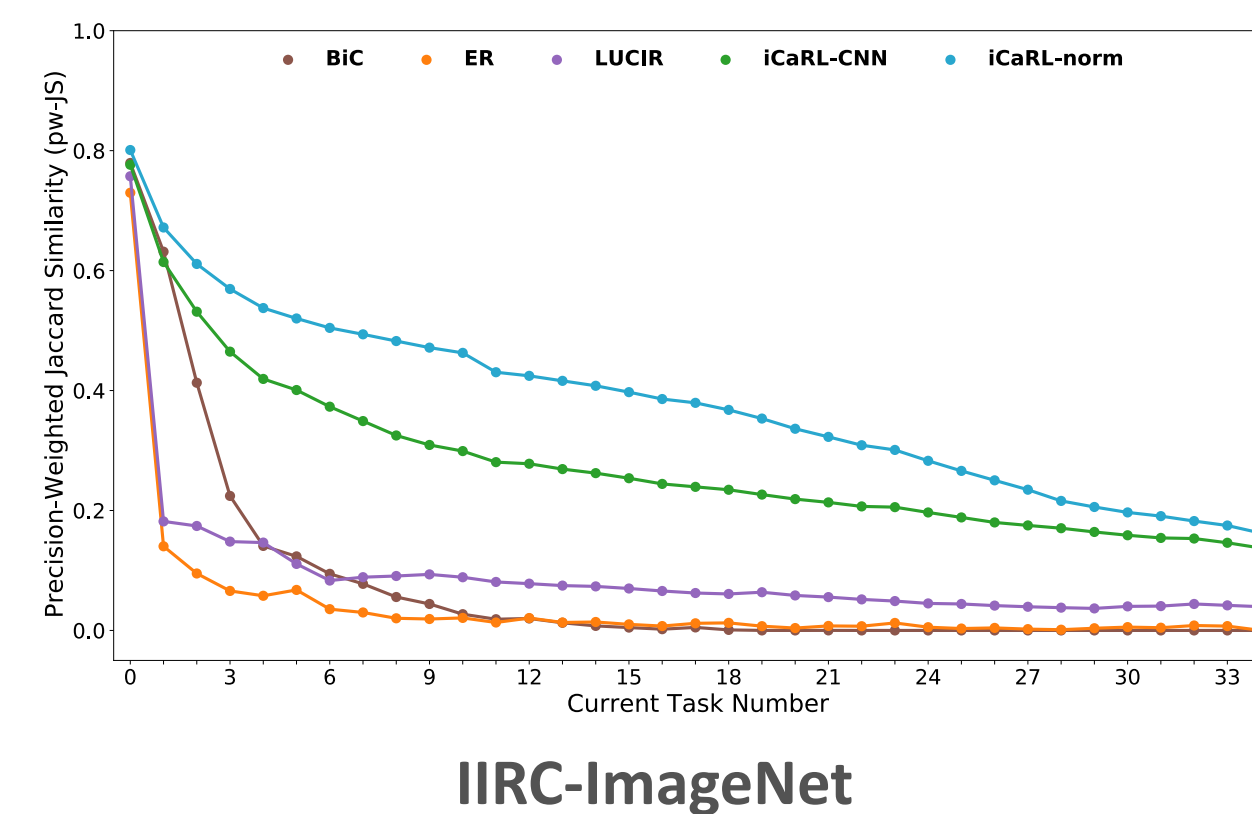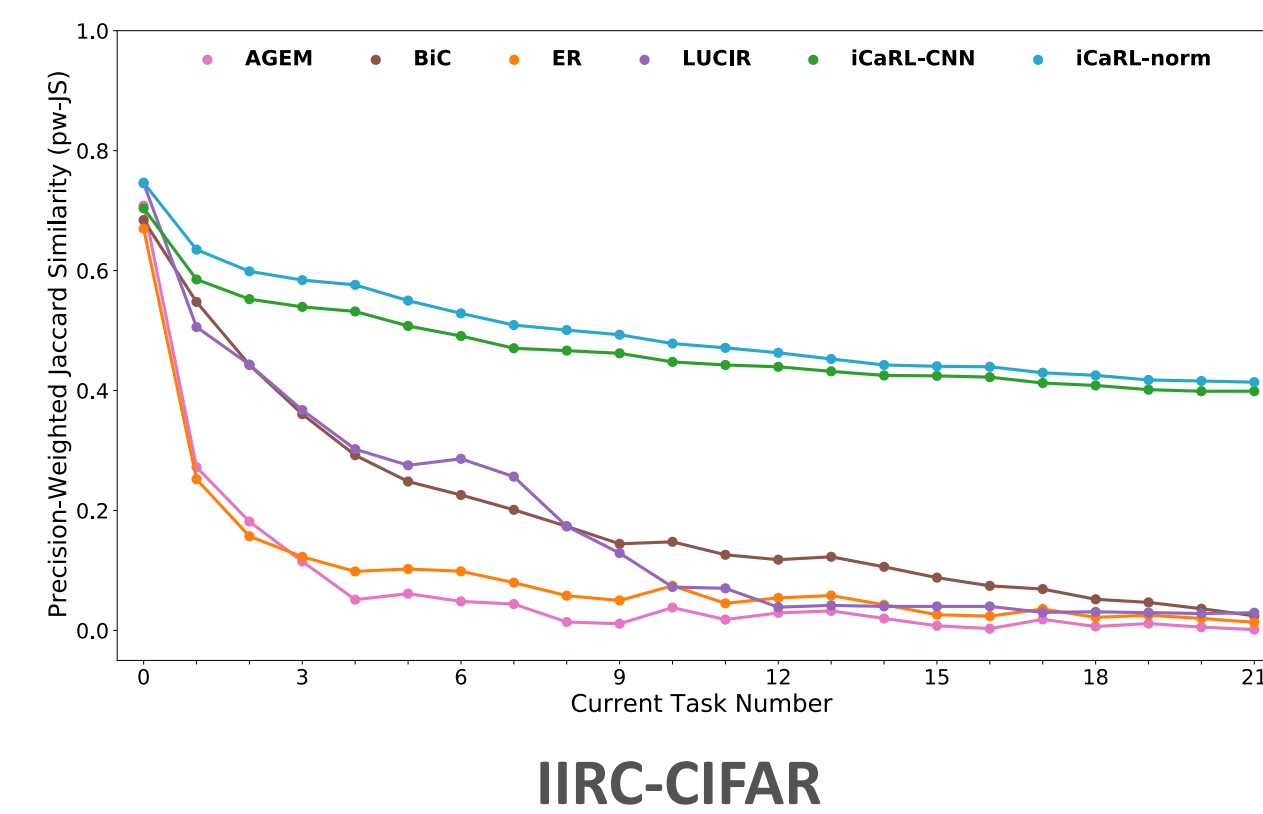

3. Metric:
$$R = \frac{1}{|D|} \sum_{(X,Y)\sim D} \frac{|f(X) \cap Y|}{|f(X) \cup Y|} \times \frac{|f(X) \cap Y|}{|f(X)|}$$
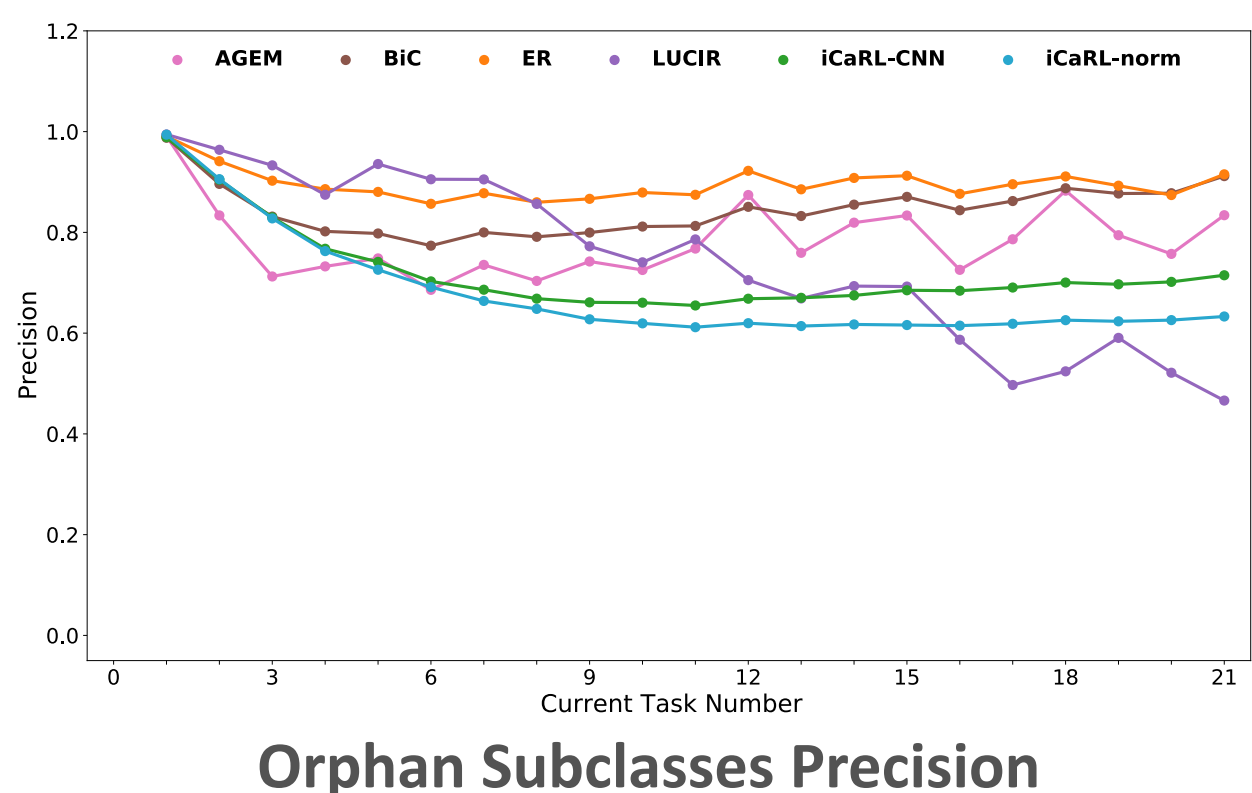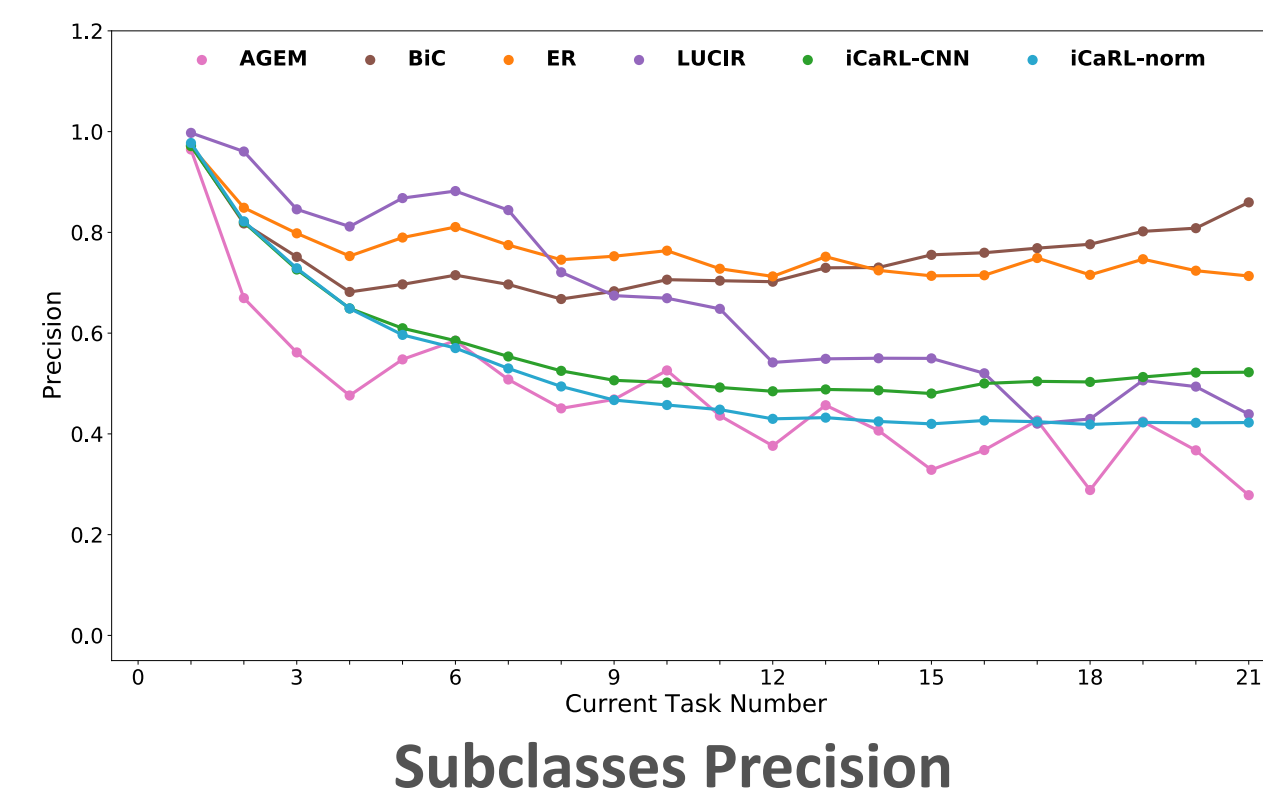
4. Experiments

4.1 Average Performance
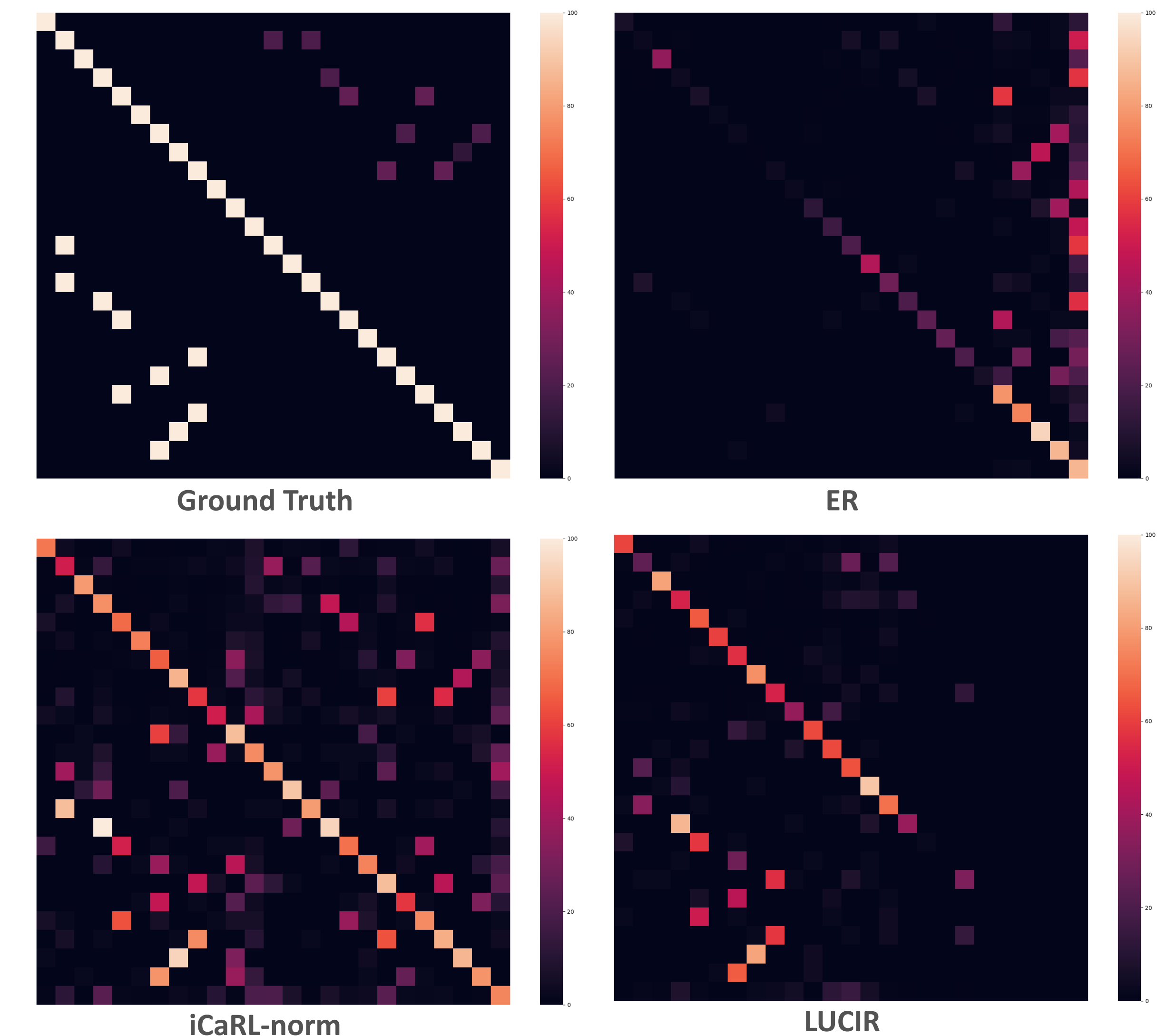

IIRC-CIFAR

IIRC-ImageNet

4.2 Superclasses Performance

IIRC-CIFAR

IIRC-ImageNet

4.3 Subclasses Per-sample Precision (IIRC-CIFAR)

Subclasses Precision

Orphan Subclasses Precision

5. Confusion Matrix

Ground Truth

ER

iCaRL-norm

LUCIR

6. Conclusion

- **A new setup and benchmark (IIRC) is introduced which tries to address a broader range of lifelong learning challenges than what the current setups allow.**

- **Distillation based methods are more capable of integrating the models previous knowledge. However, they need to be more selective in applying that knowledge.**

- **Highly regularized methods need to find a way to be more flexible in changing their beliefs, if needed.**

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