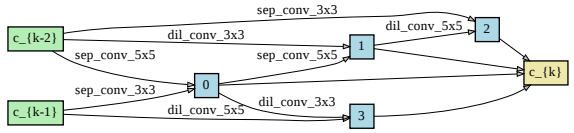
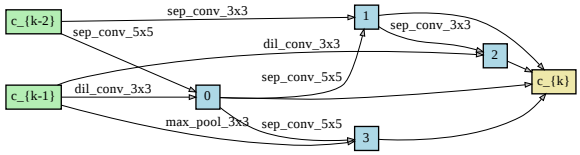
1. Appendix

1.1. Architectures Searched in DARTS Search Space

In DARTS search space, we visualize all RLNAS architectures : searched on CIFAR-10 (Figure 1), ImageNet within 600M FLOPs constrain (Figure 2), ImageNet without Flops constrain (Figure 3).

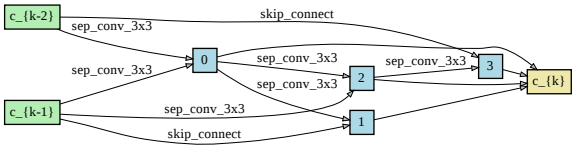


(a) normal cell

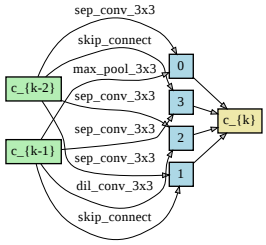


(b) reduce cell

Figure 1: The best architecture of RLNAS searched on CIFAR-10 dataset.

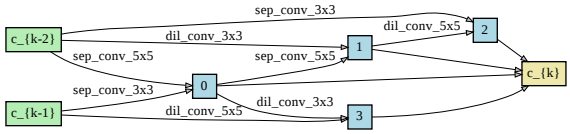


(a) normal cell

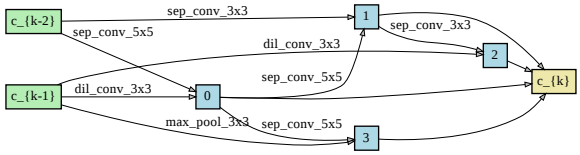


(b) reduce cell

Figure 2: The best Architecture of RLNAS searched on ImageNet dataset within 600M FLOPs constrain.



(a) normal cell



(b) reduce cell

Figure 3: The best architecture of RLNAS searched on ImageNet dataset without FLOPs constrain.

1.2. Architectures Searched in MobileNet-like Search Space

In MobileNet-like search space, we visualize the architecture searched on ImageNet (Figure 4).

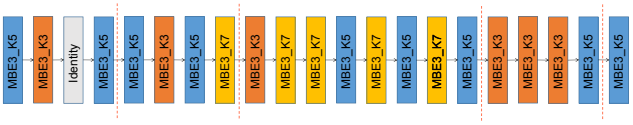


Figure 4: The best architecture of RLNAS searched on ImageNet dataset within 475M FLOPs constrain.

1.3. Comparison with UnNAS on NAS-Bench-201

We further conduct experiments on NA-Bench-201 to compare with UnNAS. We use the same pretext tasks on CIFAR-10 as UnNAS. Specifically, we leverage SPOS with pretext tasks to train supernet and the validation accuracy of pretext tasks is used as fitness to evolve architecture search. As Table 1 shows, RLNAS obtains architectures with higher test accuracy and lower accuracy variance.

Method	CIFAR-10 test acc (%)
UnNAS (*rotation task*)	92.41±0.12
UnNAS (*color task*)	92.14±0.60
UnNAS (*jigsaw task*)	92.38±0.19
RLNAS	**93.45±0.11**

Table 1: Comparison with UnNAS on NAS-Bench-201.