HEAL-SWIN:
A Vision Transformer On The Sphere

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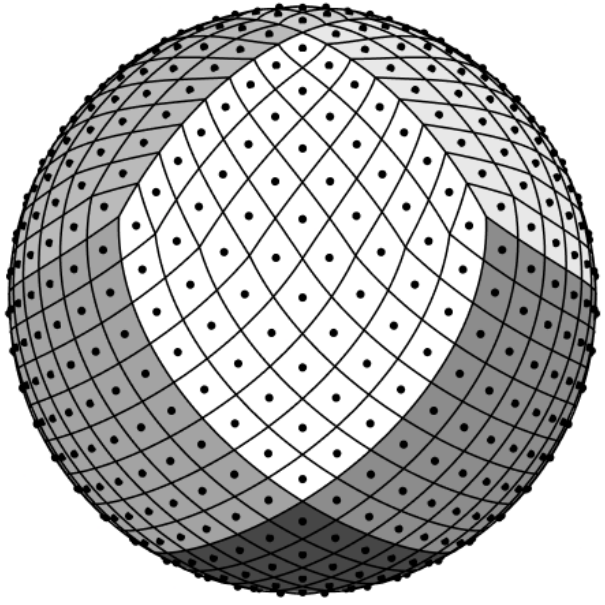
[1]Equal contribution

Central problem

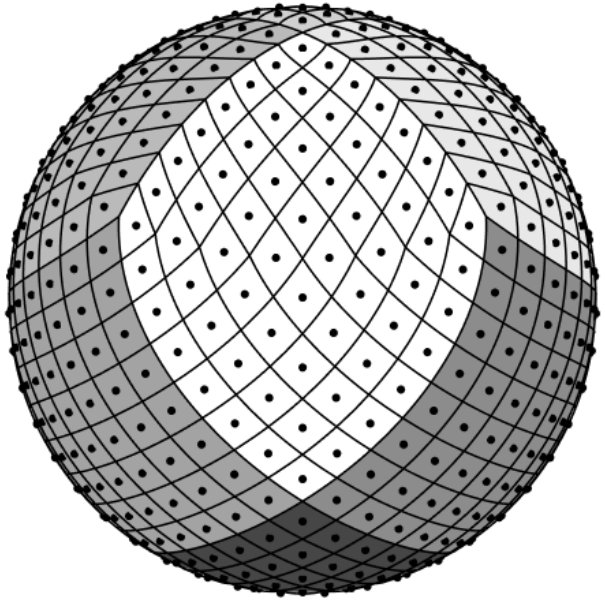
Example image from the WoodScape dataset
(Ramachandran et al., 2021)

HEAL-SWIN: HEALPix and the SWIN transformer



The HEALPix grid
(Górski et al., 2005).

HEAL-SWIN: HEALPix and the SWIN transformer



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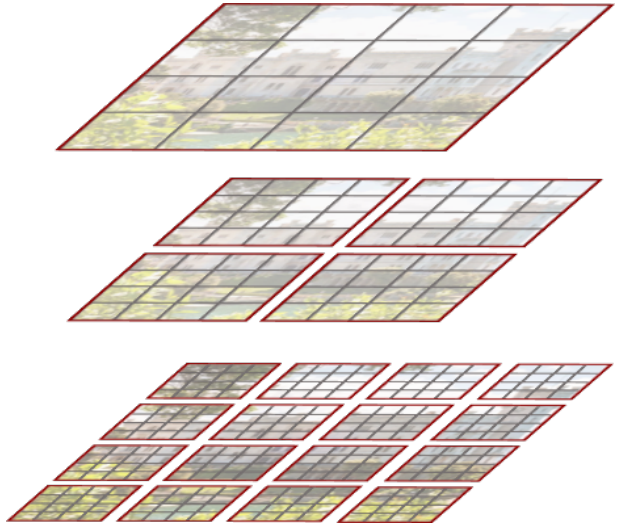
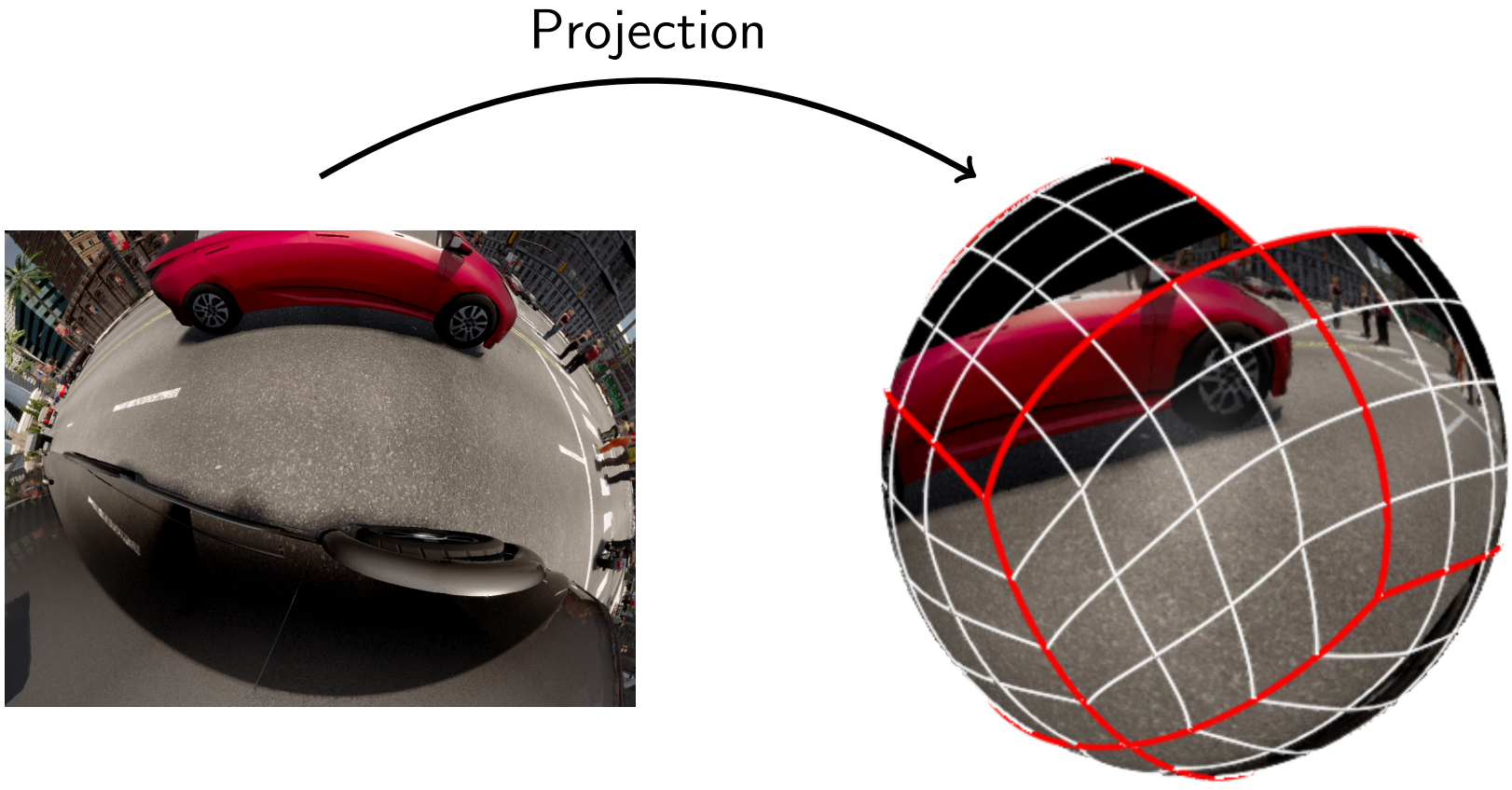
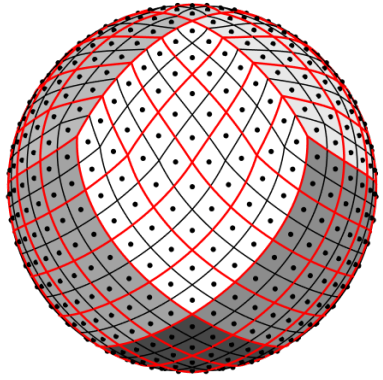


The SWIN transformer
(Liu et al., 2021).

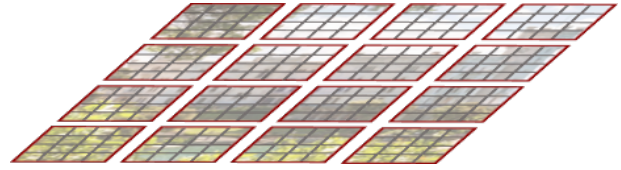
Projecting images to HEALPix



HEAL-SWIN patch merging

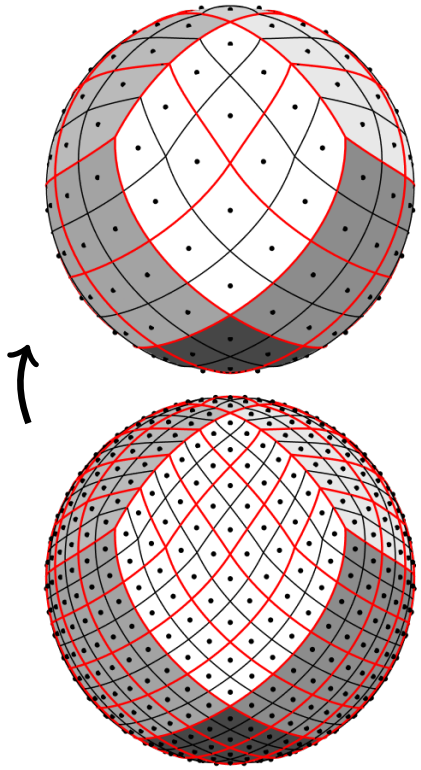


HEAL-SWIN

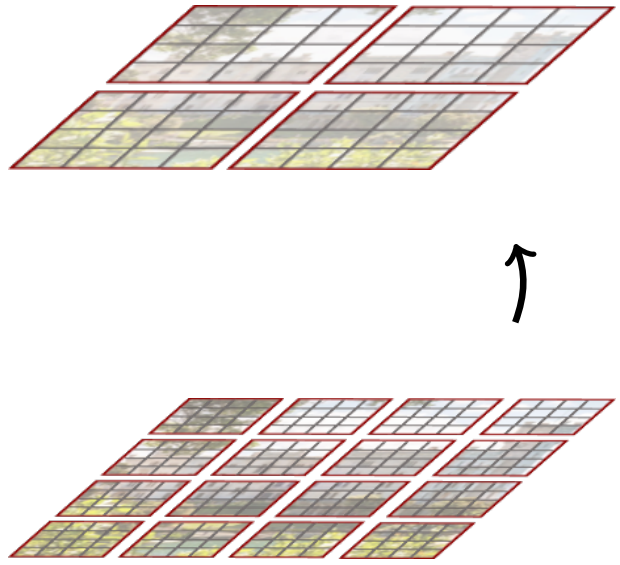


SWIN

HEAL-SWIN patch merging

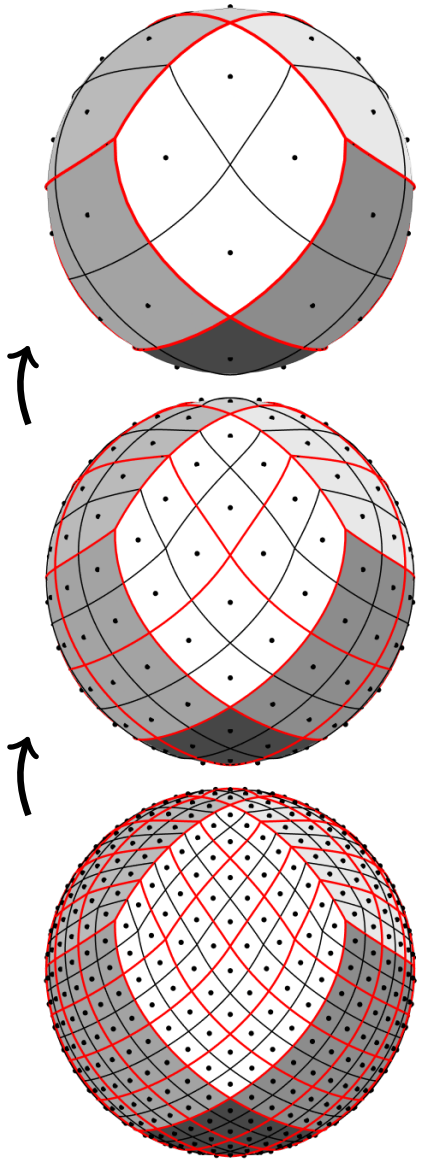


HEAL-SWIN

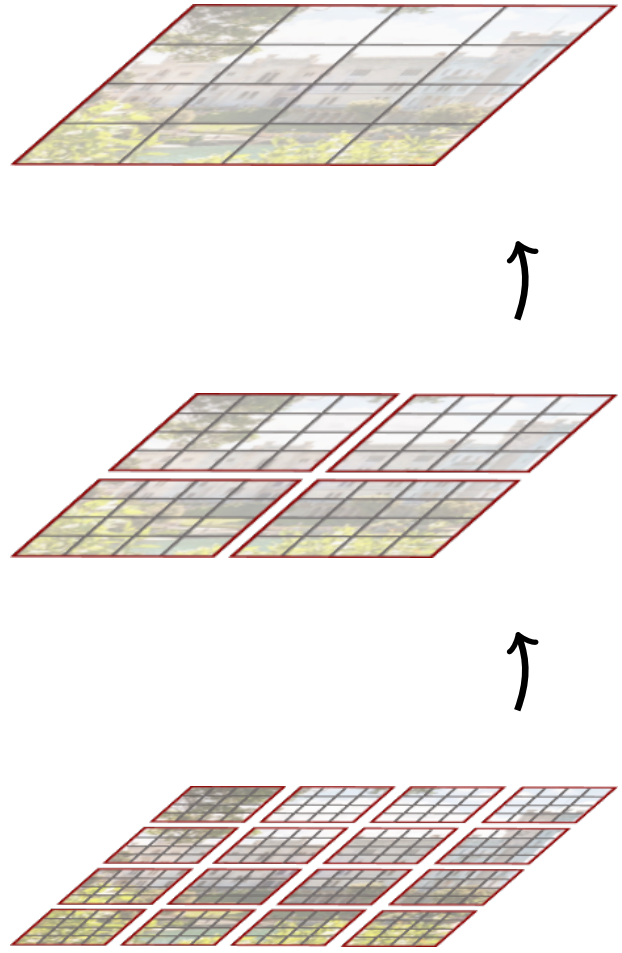


SWIN

HEAL-SWIN patch merging

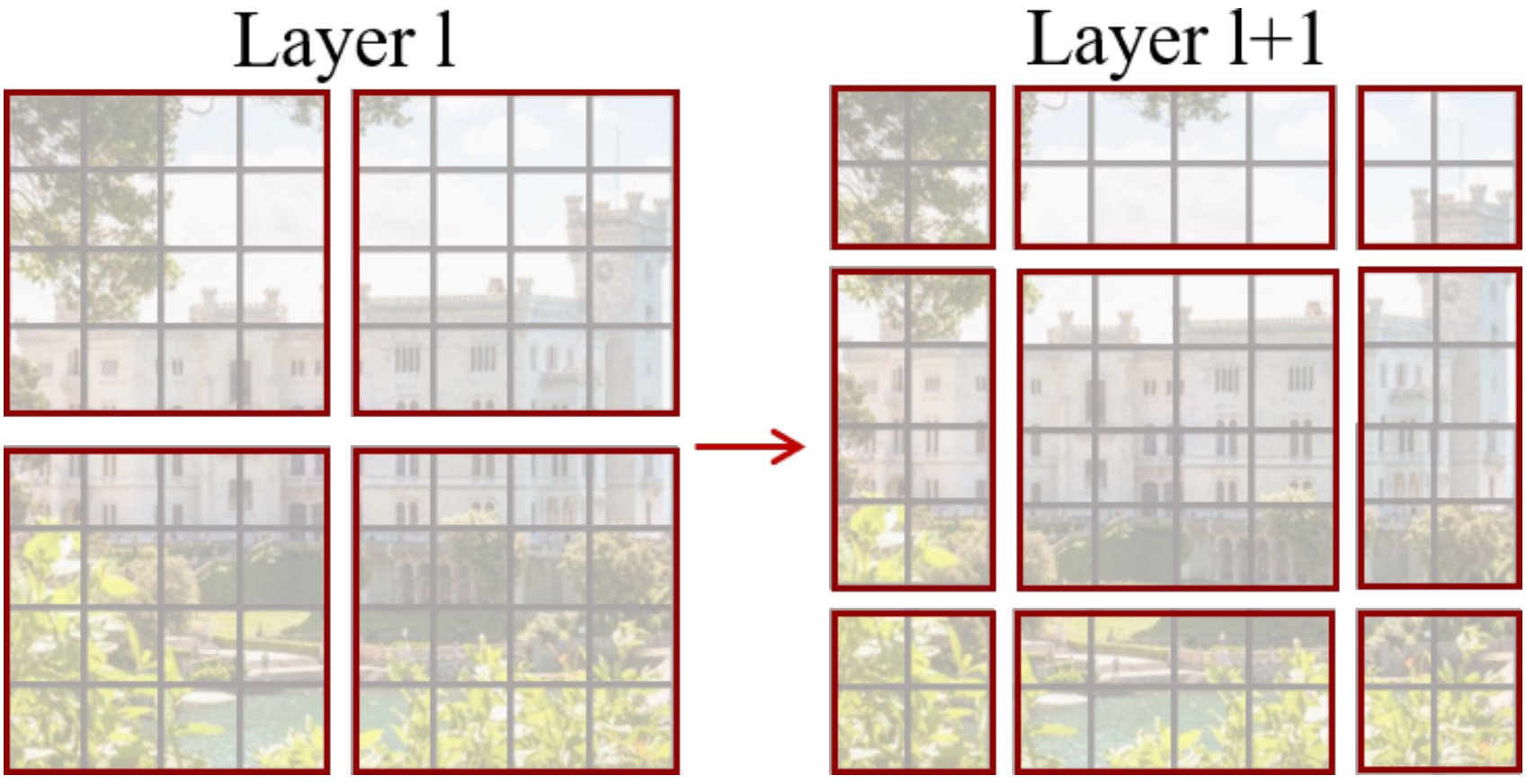


HEAL-SWIN



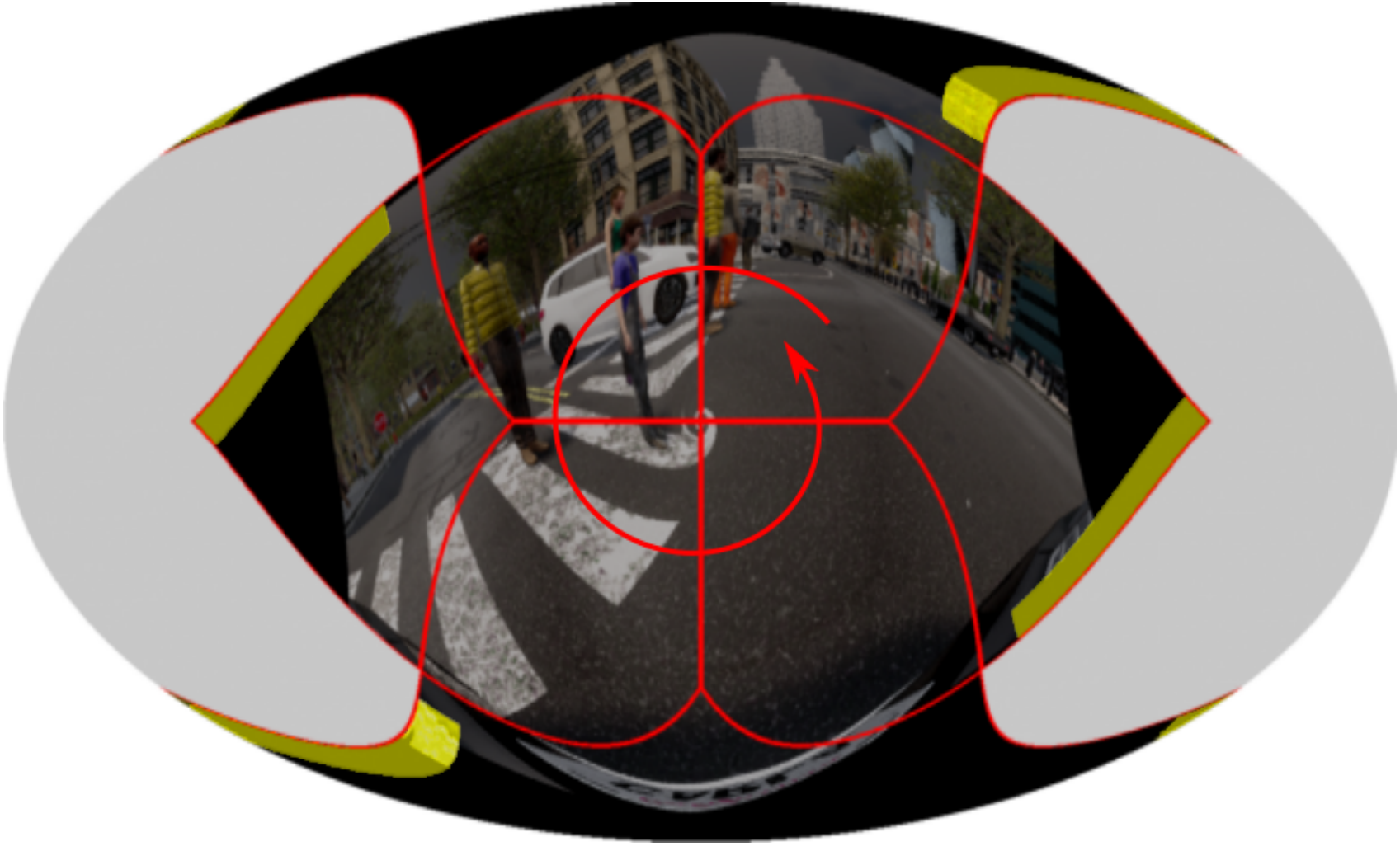
SWIN

SWIN window shift



Attention window shift in SWIN (Liu et al., 2021).

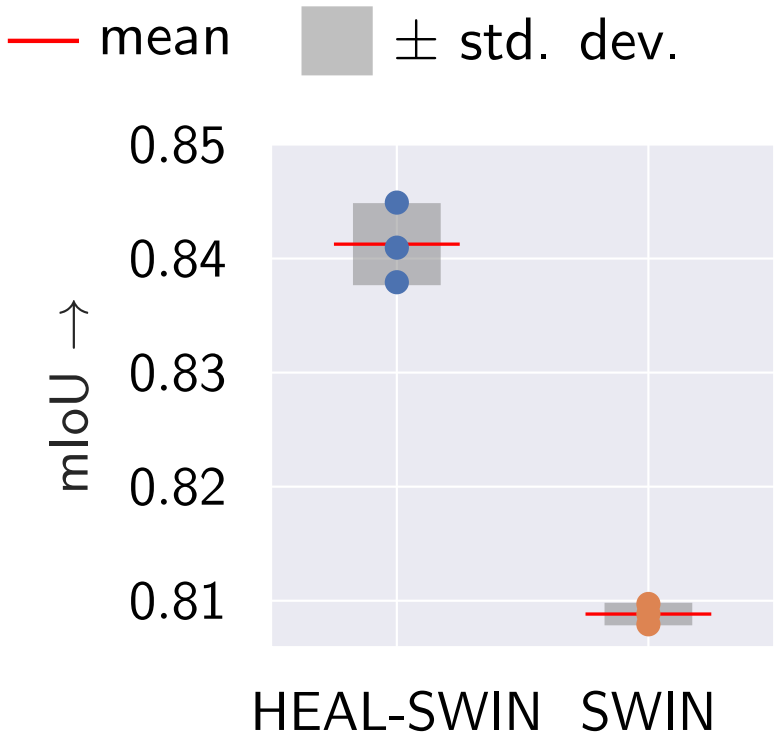
HEAL-SWIN window shift

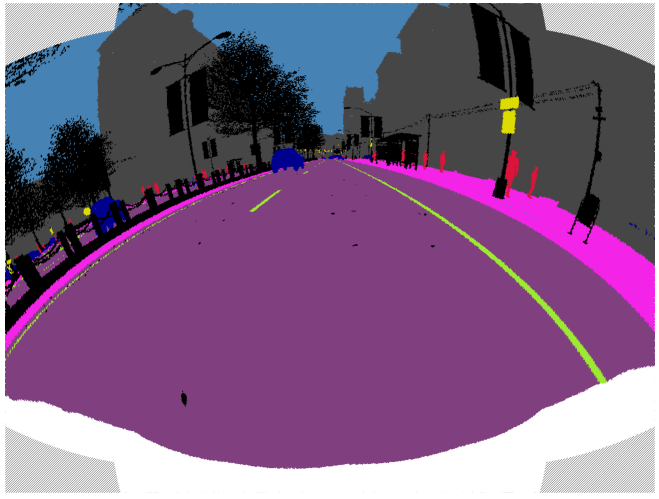


Spiral shifting in the ring representation.

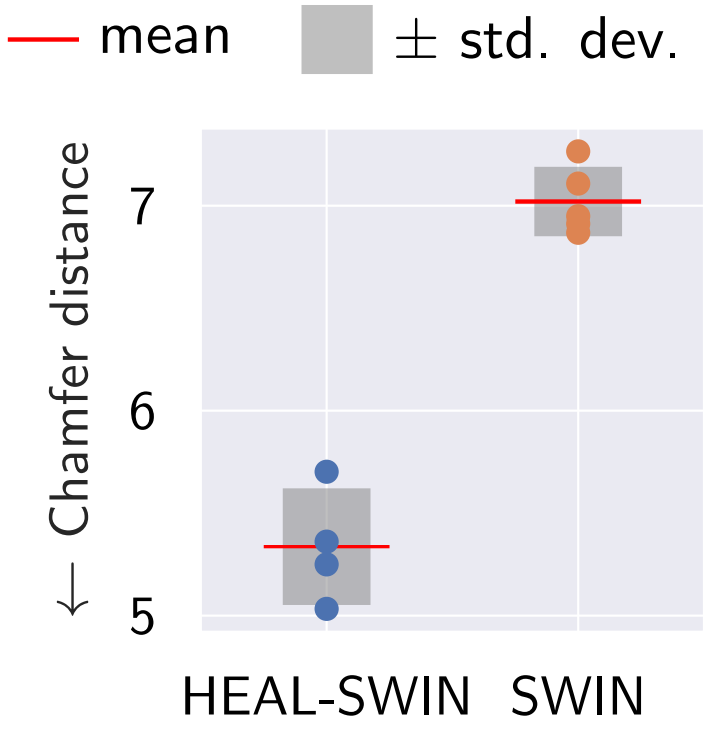
Experiments

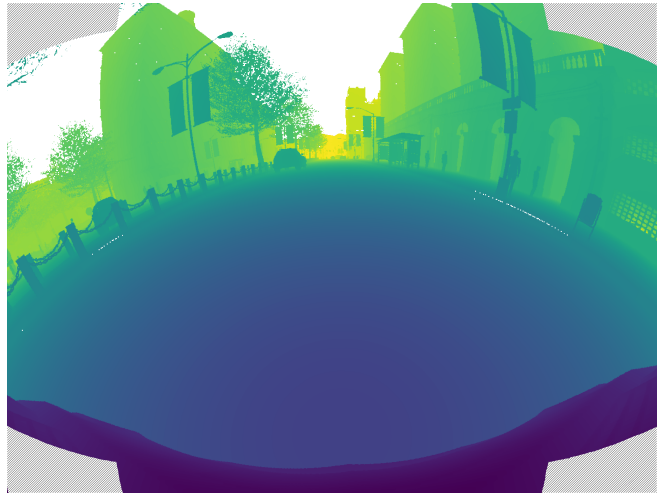
Results: Semantic segmentation on SynWoodScape





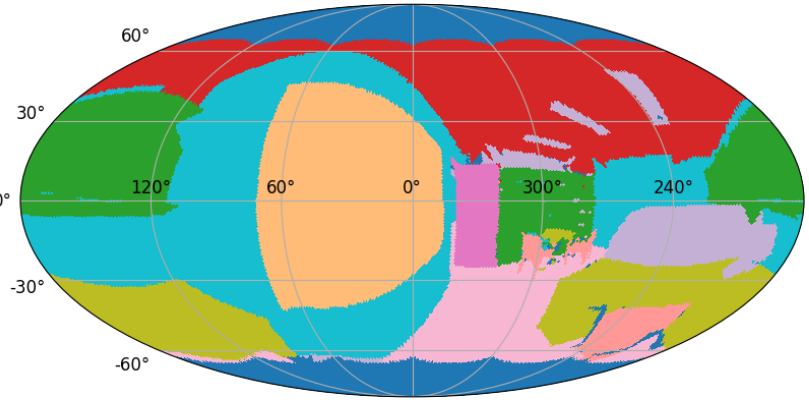
Results: Depth estimation on SynWoodScape





Results: Semantic segmentation on Stanford 2D3D-S

Model	mIoU	mAcc
Gauge CNN (Cohen et al., 2019)	39.4	55.9
UGSCNN (Jiang et al., 2019)	38.8	54.7
HexRUNet (Zhang et al., 2019)	43.3	58.6
SphCNN (Esteves et al., 2018; 2020)	40.2	52.8
Spin-SphCNN (Esteves et al., 2020)	41.9	55.6
HEAL-SWIN (Ours)	**44.3**	**61.9**



Thanks!

Read our paper and come to our poster!

Link to our paper: