



Report and Results

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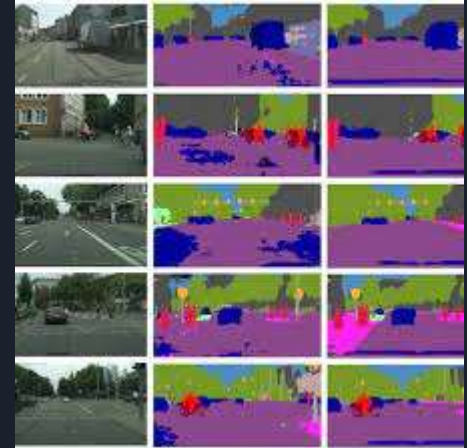
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Introduction:

Semantic Segmentation : (A type under image segmentation)

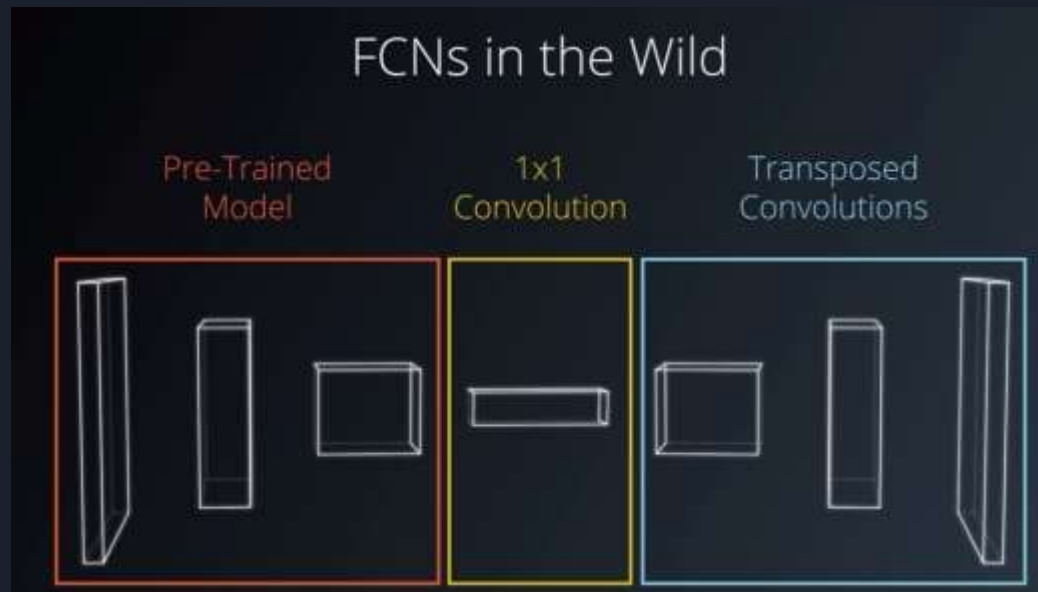
Semantic Segmentation is **the process of assigning a label to every pixel in the image**. This is in stark contrast to classification, where a single label is assigned to the entire picture. Semantic segmentation treats multiple objects of the same class as a single entity.



Model Architecture:

Here, I used the pretrained VGG-16 network as the Pre-Trained Model.

1X1 convolution in place of FCNs.





Purpose:

The main reason behind using VGG-16 as the pretrained model (which combines which 1X1 convolution to form encoder network) is that I have worked on projects related to Style Transfers and there I have witnessed that VGG-16 are good at extracting the features of an image and learn from them pretty smoothly. Also this paper confirms the use of VGG-16 is good in semantic segmentation related works - [paper](#).



Datasets Used in experiment:

1. Kitti Dataset
2. Plain Road Dataset
3. Garden Dataset
4. Forest Dataset
5. Agro-field Dataset
6. Gravel Road
7. Snow Road
8. Desert Road
9. Rainy Season Road
10. Pathways
11. And many other miscellaneous categories



Training Details:

Number of Epochs : 4

Batch Size : 8

Learning Rate : 0.001

Optimizer : Adam

Random Initializer with Std. Deviation = 0.01

L2 regularization parameter = 0.0001



Training Logs :

Number Of Epochs

Average Loss

10

0.240

20

0.141

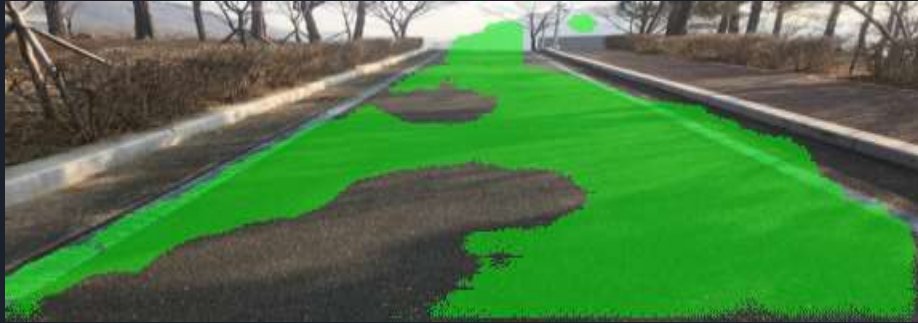
30

0.119

40

0.075

Results (older):



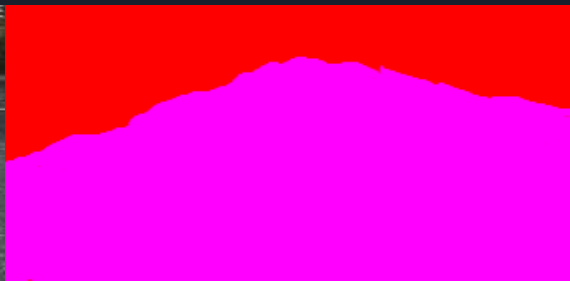
Final Results: (Plain Road)

IMAGE

OUTPUT

MASKS



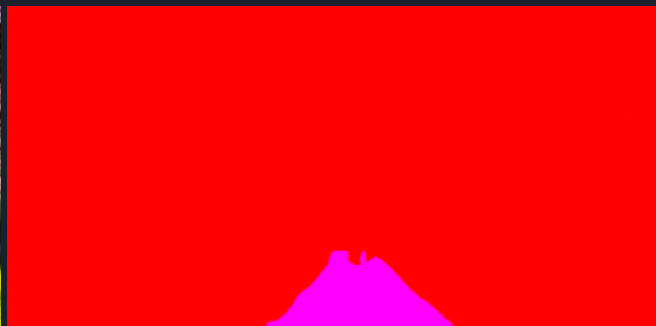


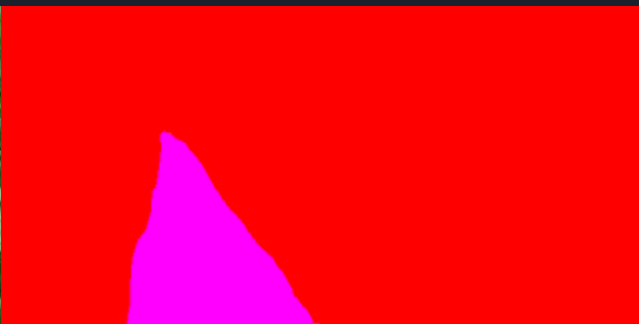
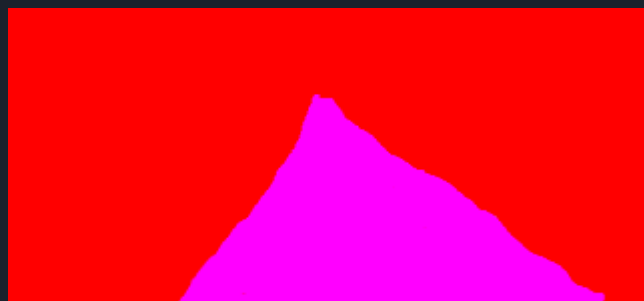
Final Results: (Garden Dataset)

IMAGE

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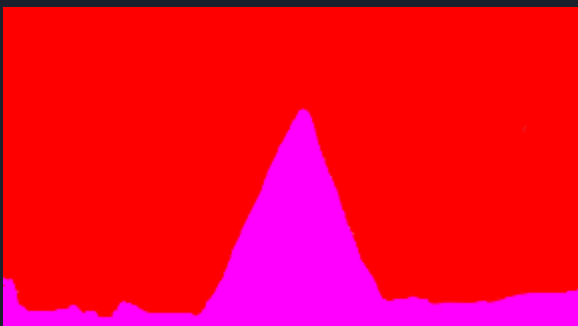
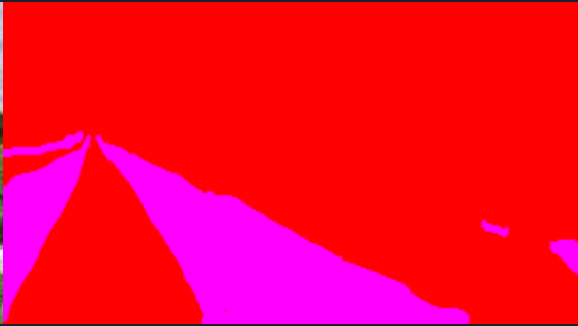
Final Results: (Agro field)

IMAGE

OUTPUT

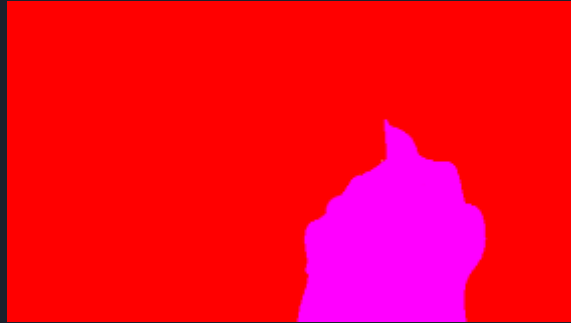
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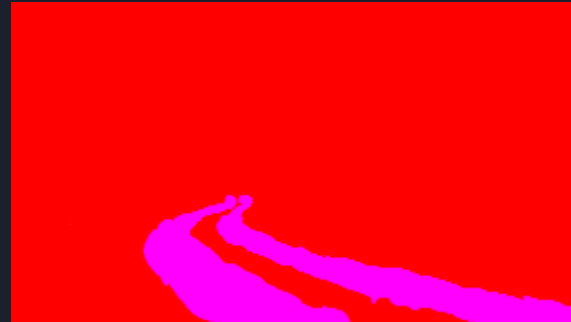


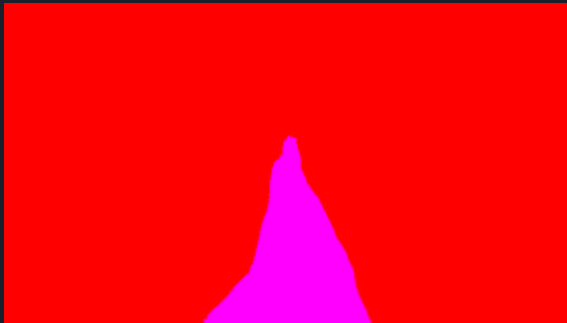
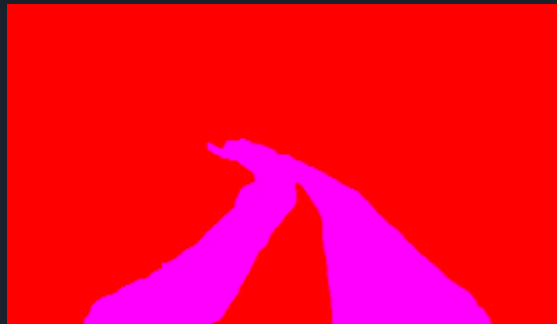
Final Results (Forest) :

IMAGE

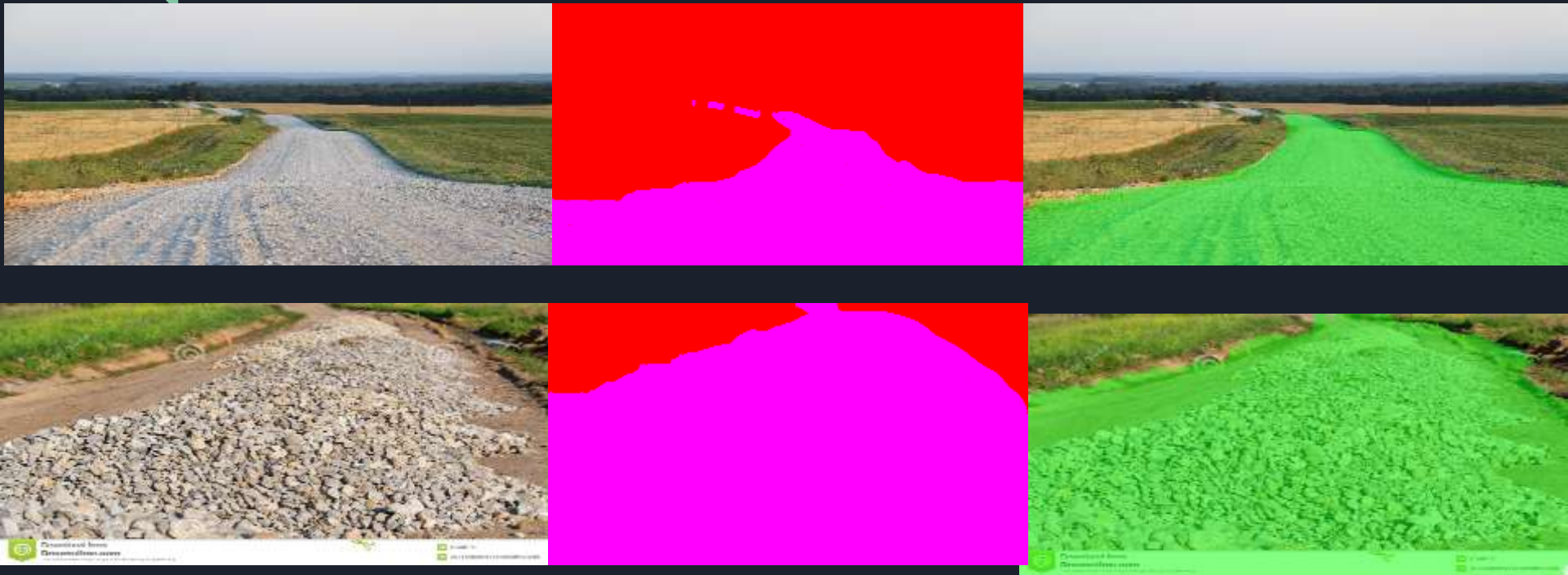


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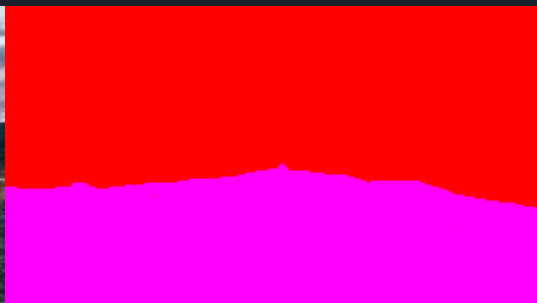


Final Results (Gravel Road):





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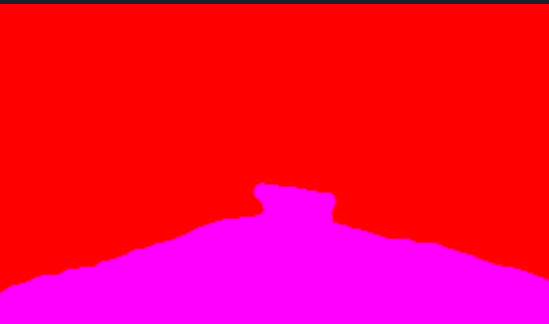
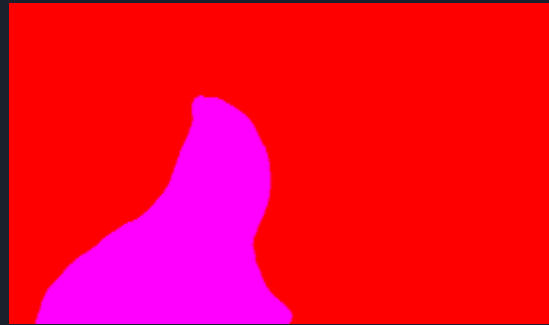


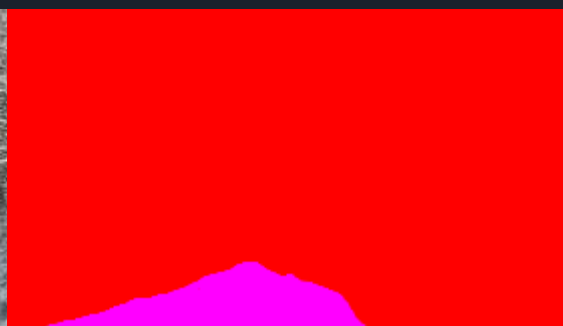
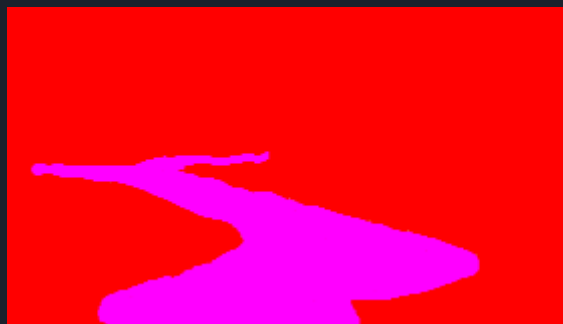
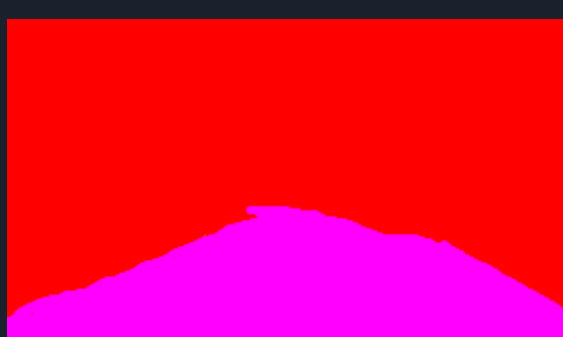
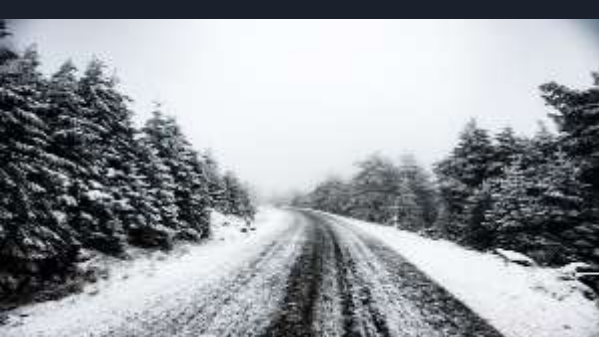
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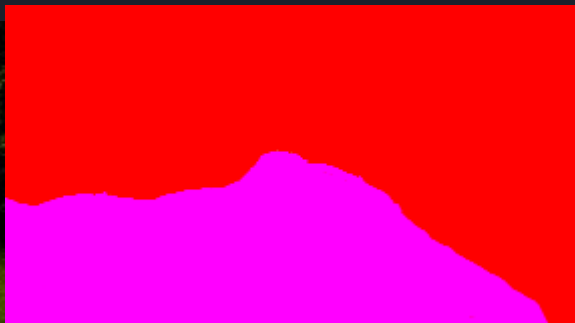
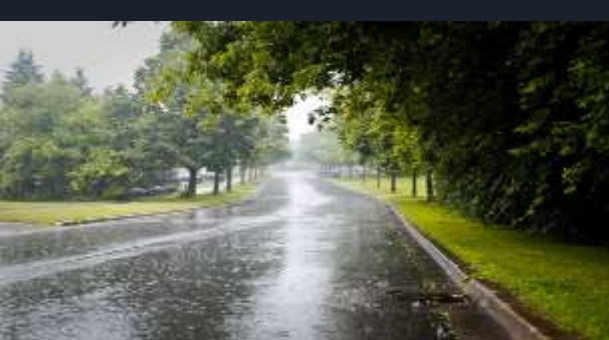
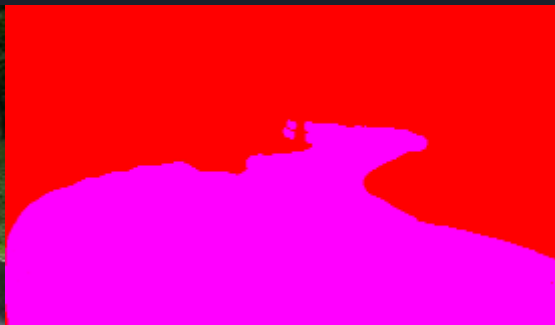
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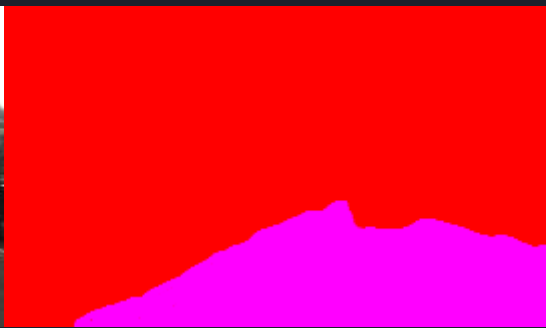
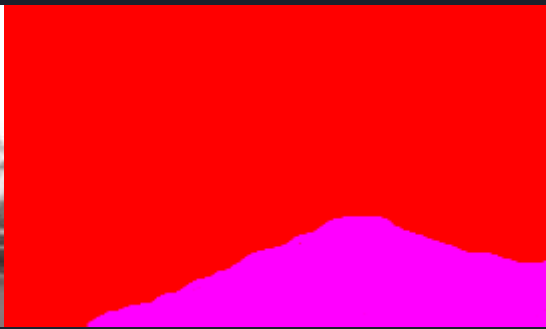
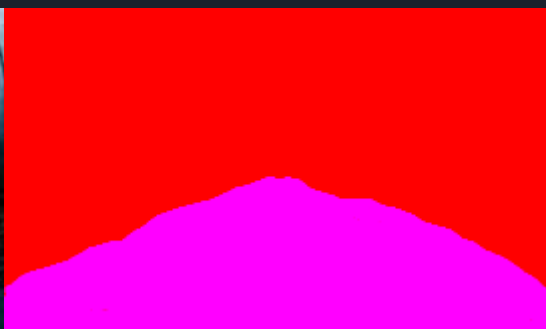
Final Results (Snow Road):



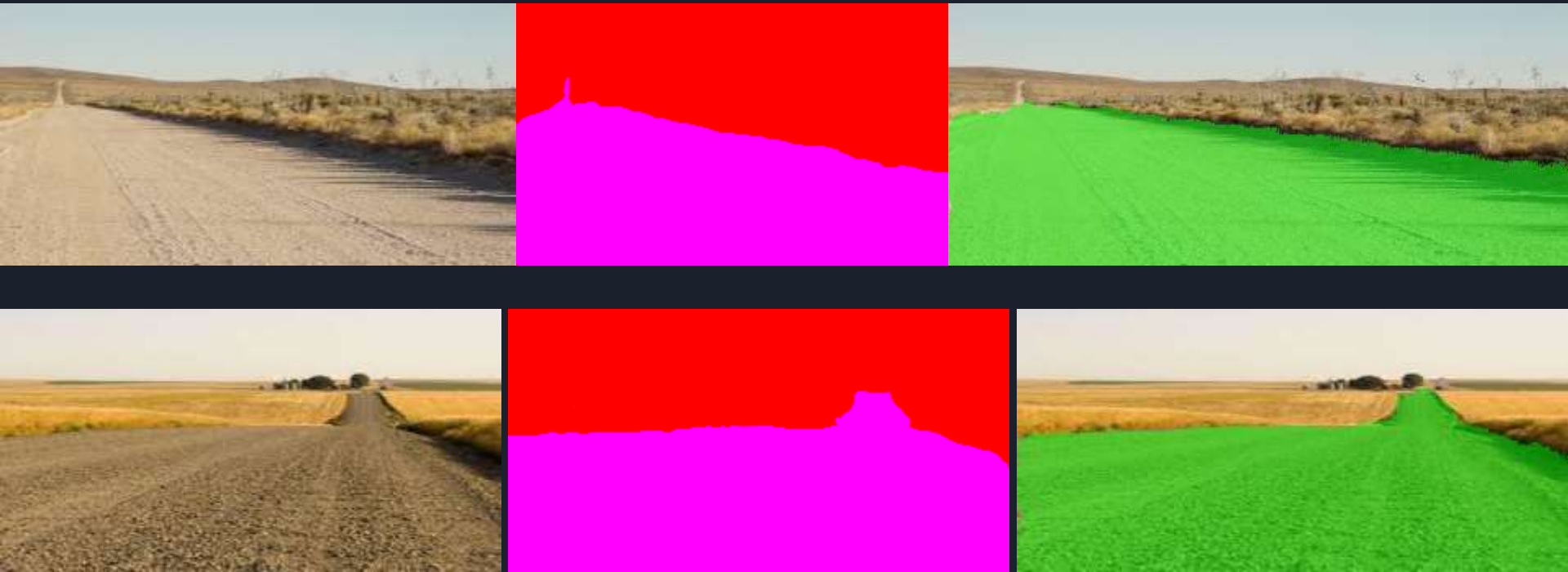


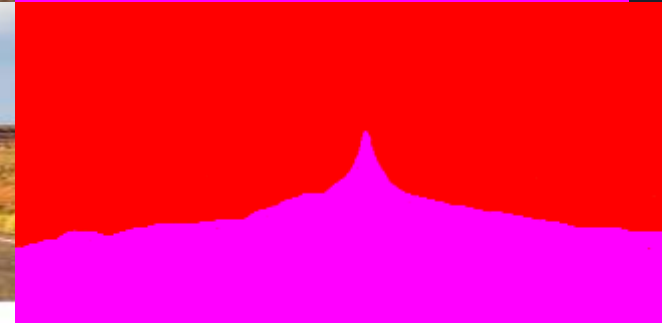
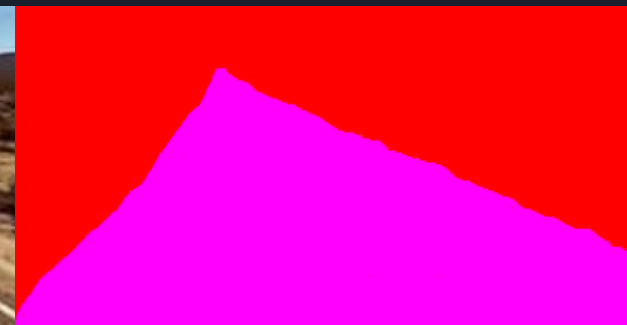
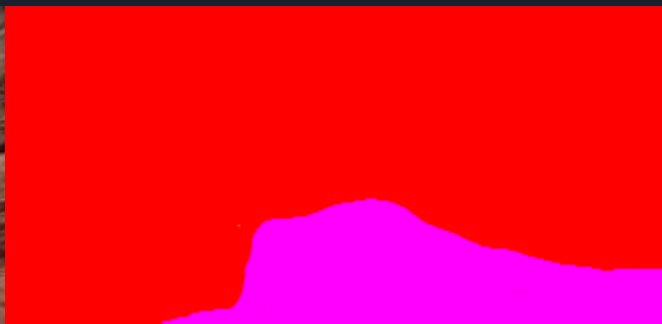
Final Results (Rainy Season Roads):





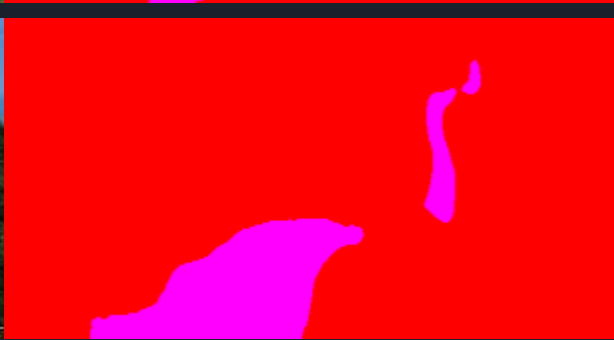
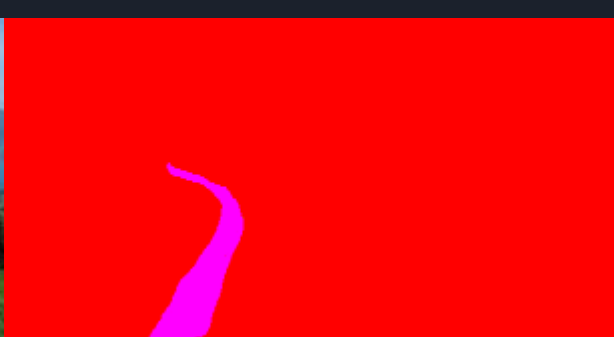
Final Results (Desert Road):





Final Results (Pathways including valleys):





Some more Results:



IMAGE

OUTPUT

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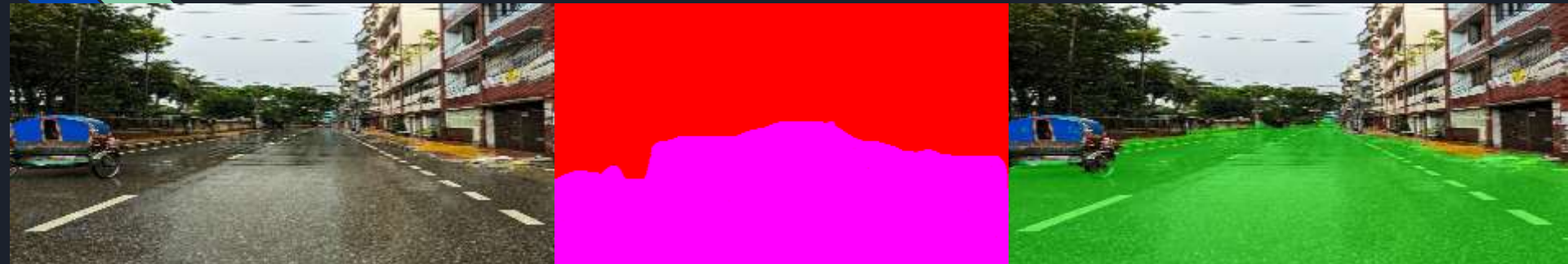
Some more results:



IMAGE

OUTPUT MASKS

Some more results :



IMAGE

OUTPUT MASKS



Thank You !