

Equipe - Baião de Dados

Segmentação de Estradas e Ruas

Alunos:

- **Francisco Rafael Braga de Lima**
- **João Pedro Pereira da Silva**
- **José Lucas da Silva Pinheiro**
- **Karen Evellyn Vieira Ribeiro**
- **Sofia Soares Cavalcante**

Sumário

- Introdução
- Metodologia
- Resultados
- Conclusões

Introdução

Resumo do problema

O DeepGlobe Road Extraction Challenge apresenta o desafio de extrair, automaticamente, estradas e ruas a partir de imagens de satélite.

Porque esse problema?

Devido à grande necessidade de informações acerca de acessibilidade nas zonas de catástrofe, com intuito de dar respostas rápidas às crises que se encontram.

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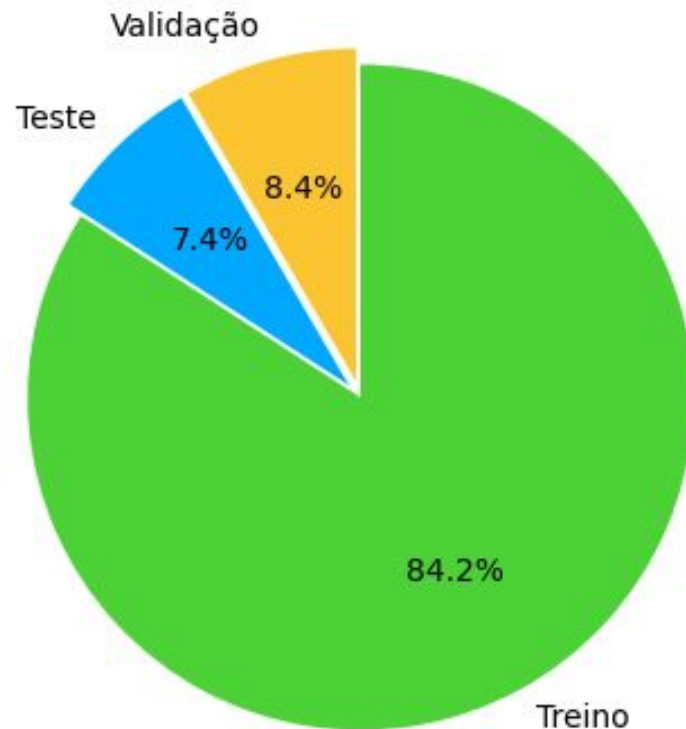
Objetivo geral

Segmentar as imagens do dataset a fim de criar uma rede neural capaz de dissociar estradas de terreno selvagem em imagens de satélite.

Introdução

BASE DE DADOS:

- Total de imagens: 14.796 imagens
 - Conjunto de treinamento: 12.452 imagens;
 - Conjunto de validação: 1.243 imagens;
 - Conjunto de teste: 1.101 imagens.



Introdução

- Conjunto de treinamento
 - 6.226 pares de imagens e suas respectivas máscaras.

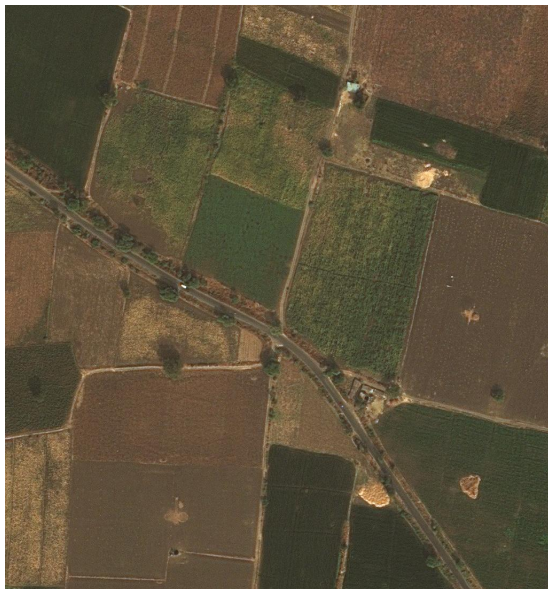


Imagem de satélite



Máscara da imagem

Introdução

- Conjunto de validação e de teste
 - "imagem_sat.jpg"

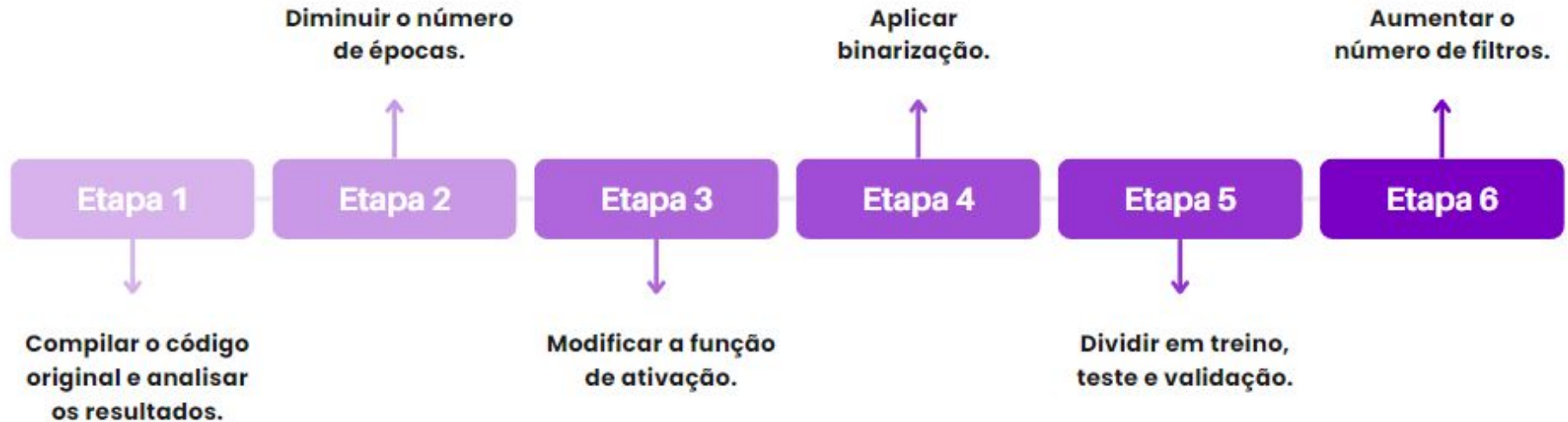


Imagem de validação



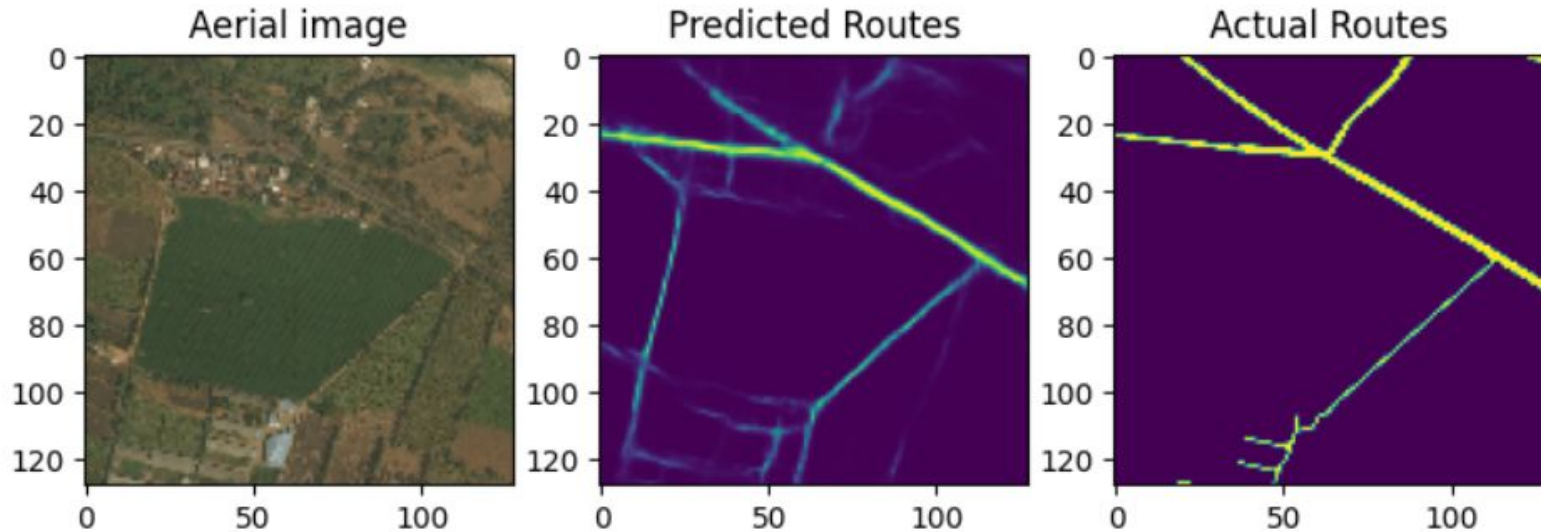
Imagem de teste

Metodologia



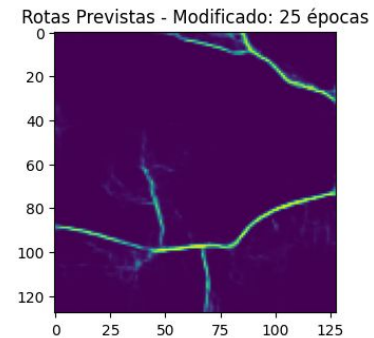
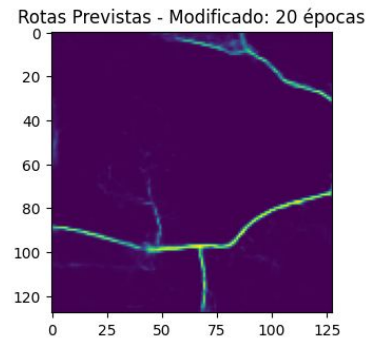
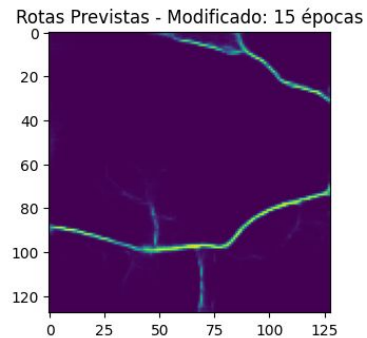
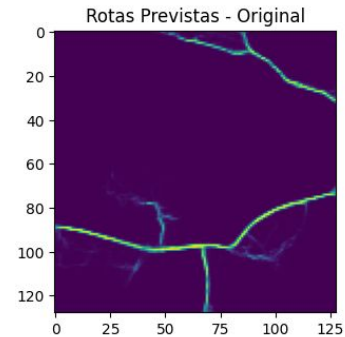
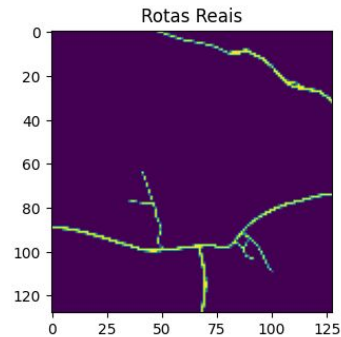
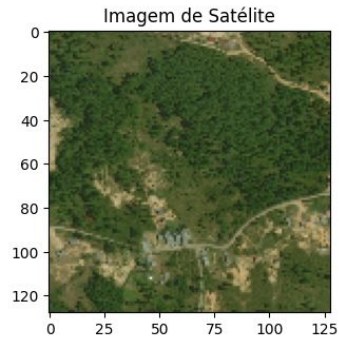
Metodologia

ETAPA 1 - Código original



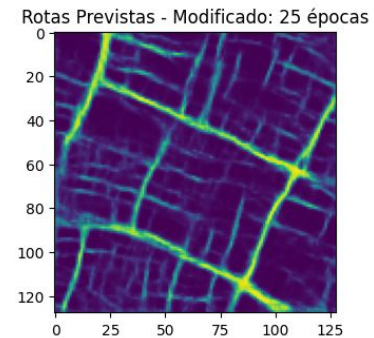
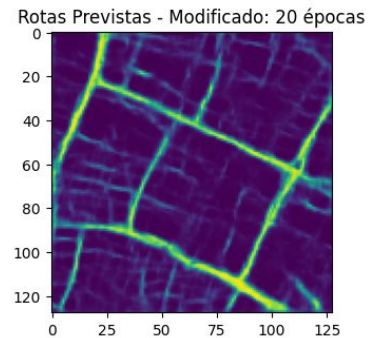
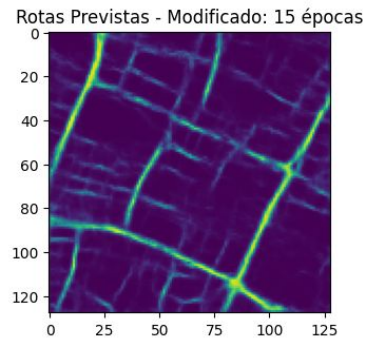
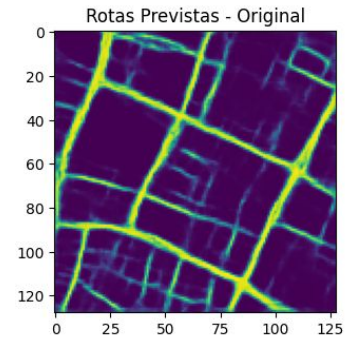
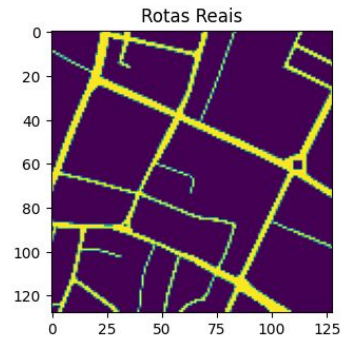
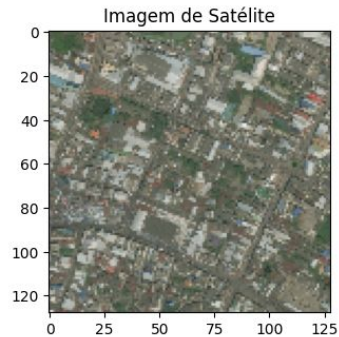
Metodologia

ETAPA 2 – Reduzindo o número de épocas



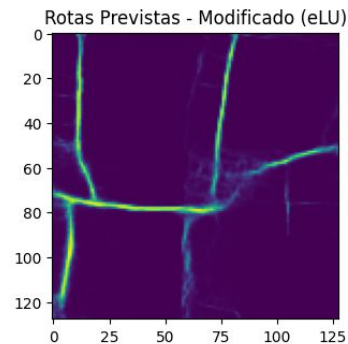
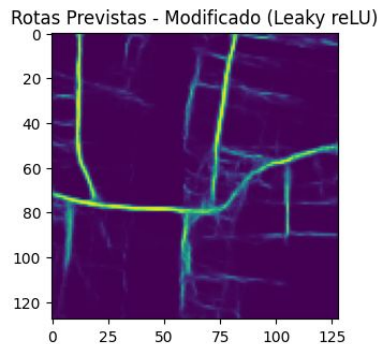
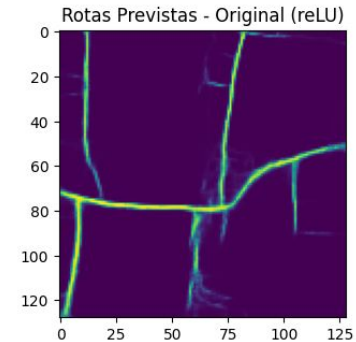
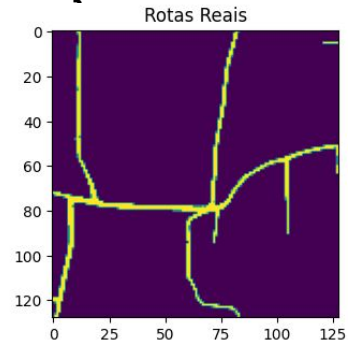
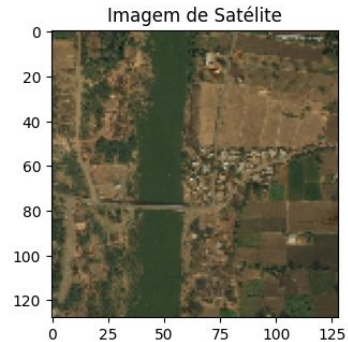
Metodologia

ETAPA 2 – Reduzindo o número de épocas



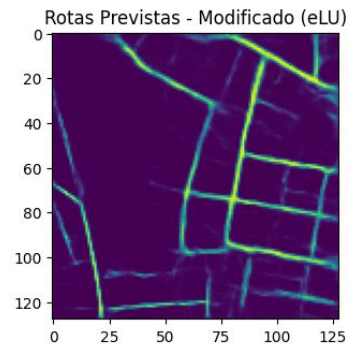
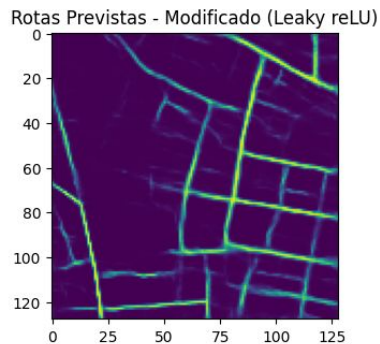
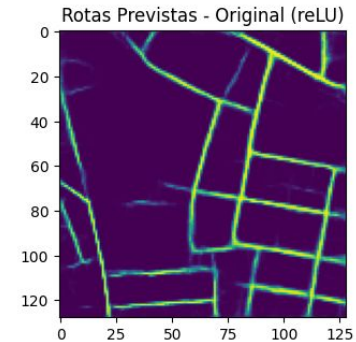
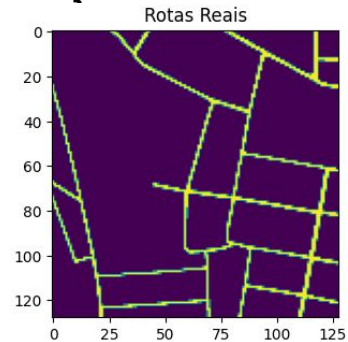
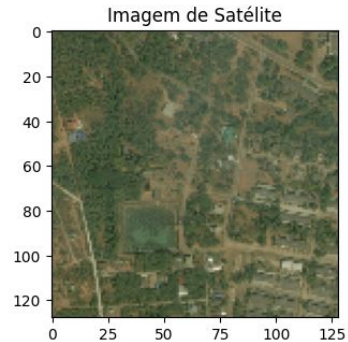
Metodologia

ETAPA 3 – Modificando a função de ativação



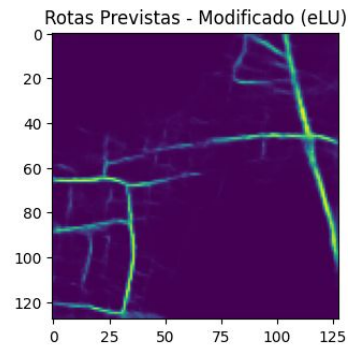
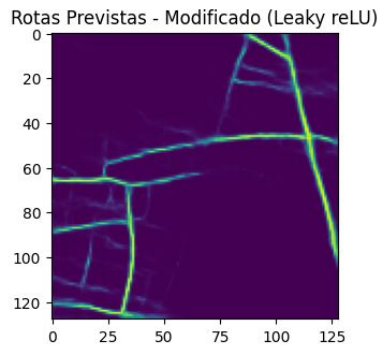
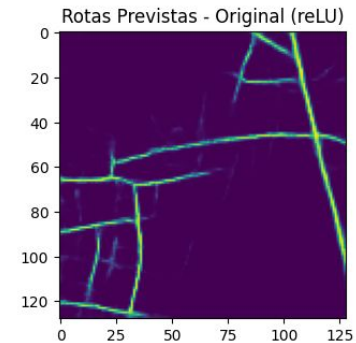
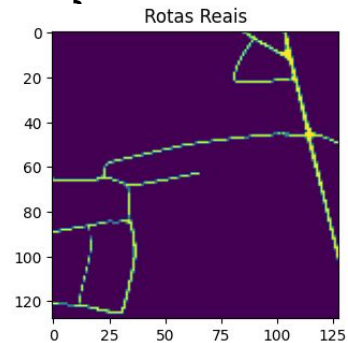
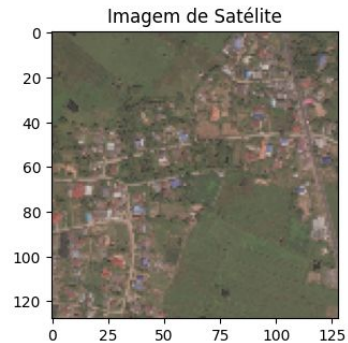
Metodologia

ETAPA 3 – Modificando a função de ativação



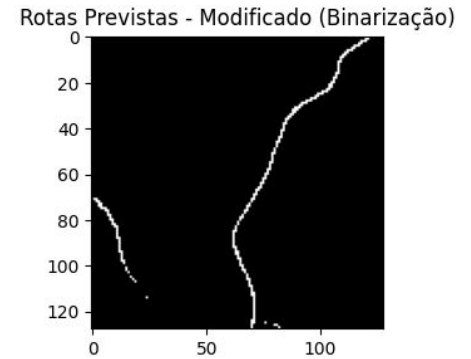
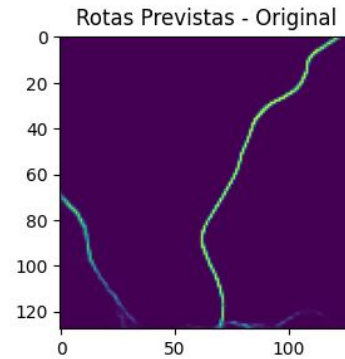
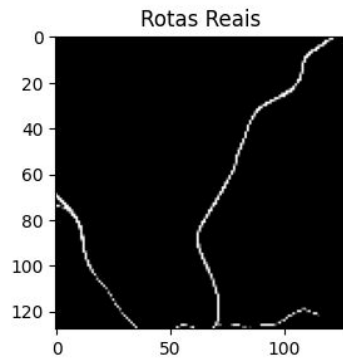
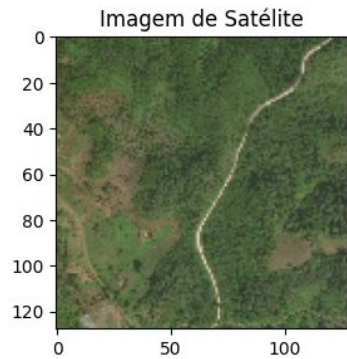
Metodologia

ETAPA 3 – Modificando a função de ativação



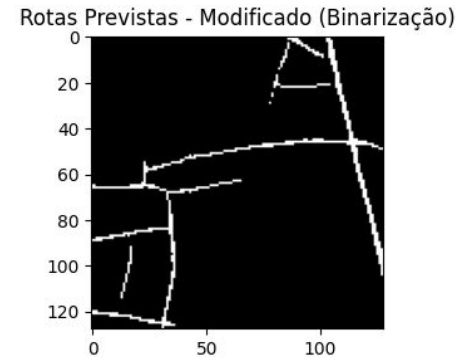
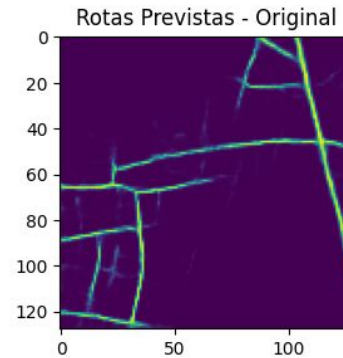
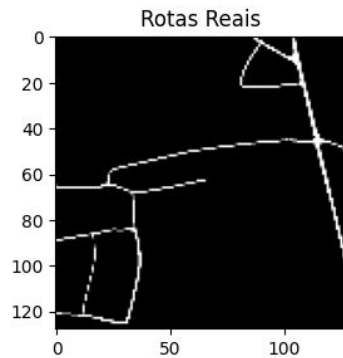
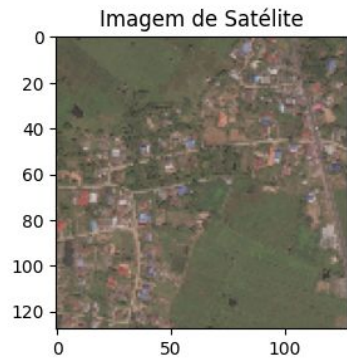
Metodologia

ETAPA 4: Aplicando binarização no resultado



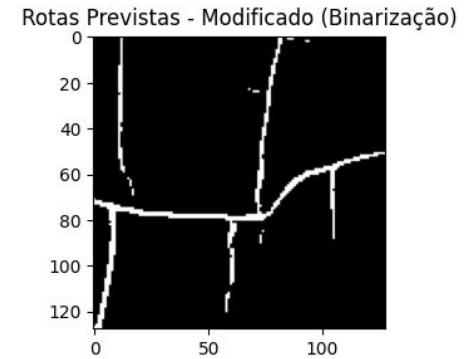
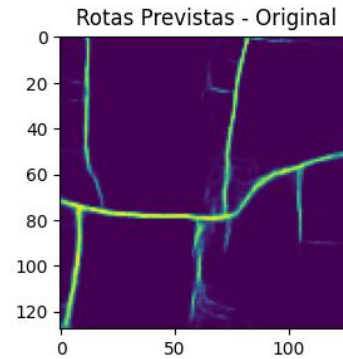
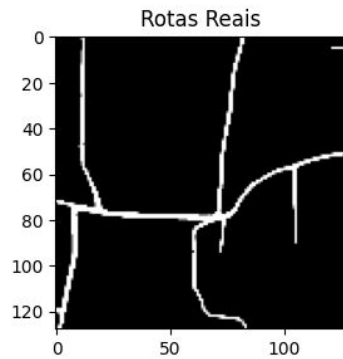
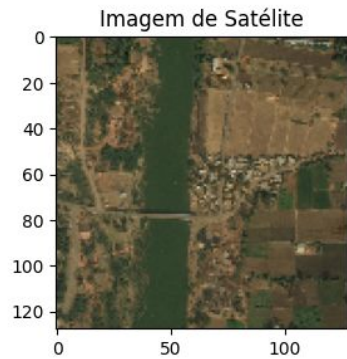
Metodologia

ETAPA 4: Aplicando binarização no resultado



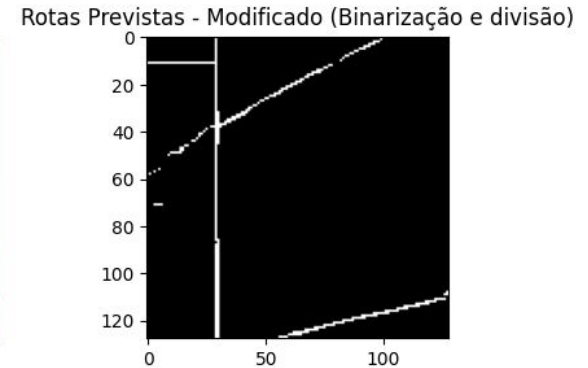
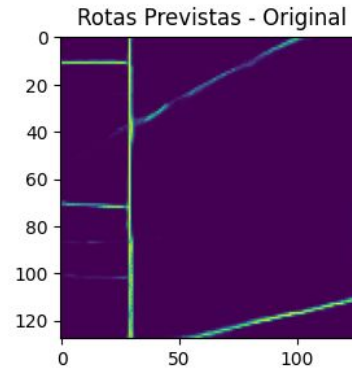
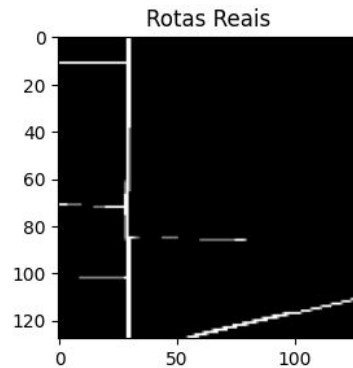
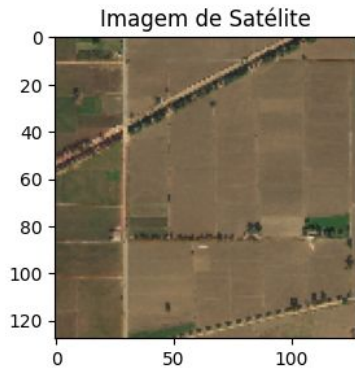
Metodologia

ETAPA 4: Aplicando binarização no resultado



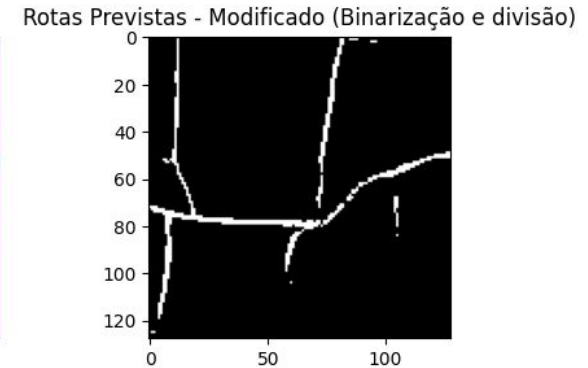
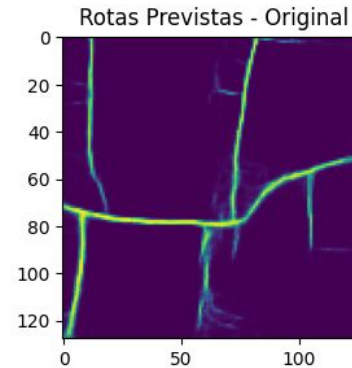
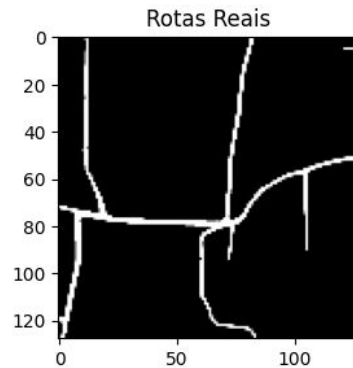
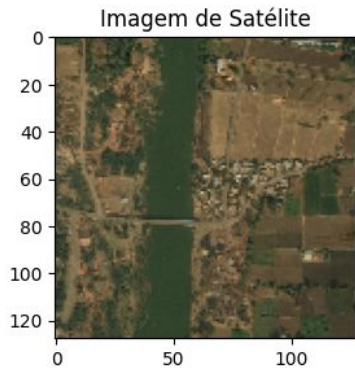
Metodologia

ETAPA 5 - Dividir em treino, teste e validação



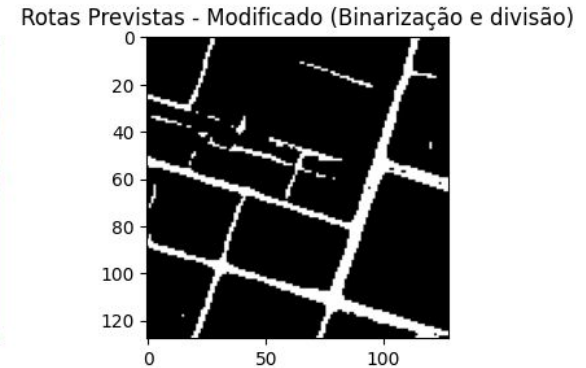
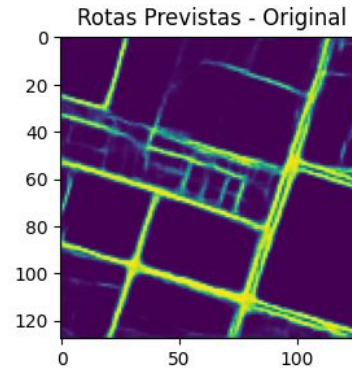
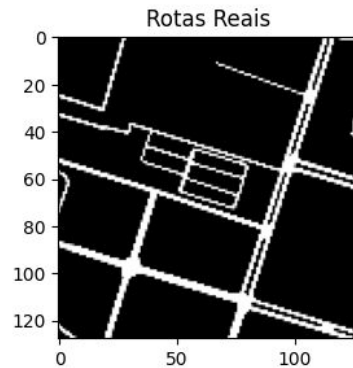
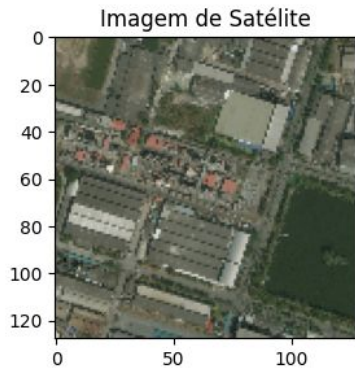
Metodologia

ETAPA 5 – Dividir em treino, teste e validação



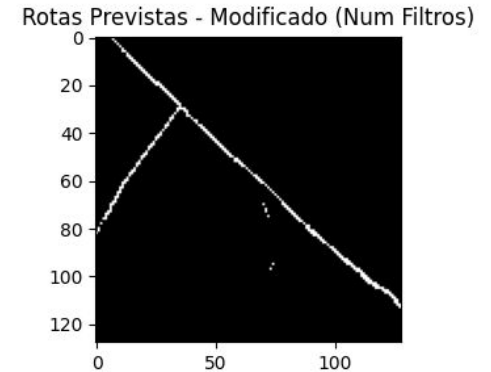
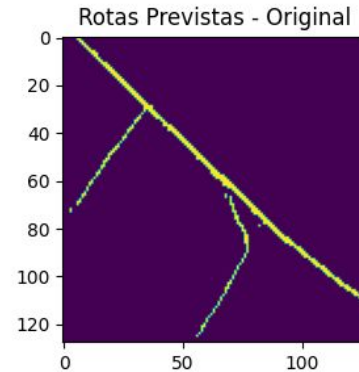
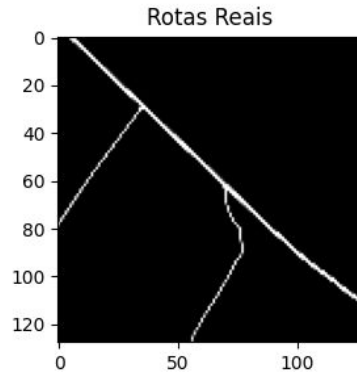
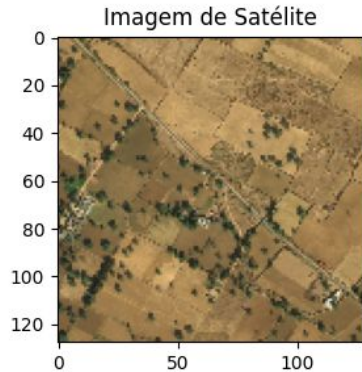
Metodologia

ETAPA 5 – Dividir em treino, teste e validação



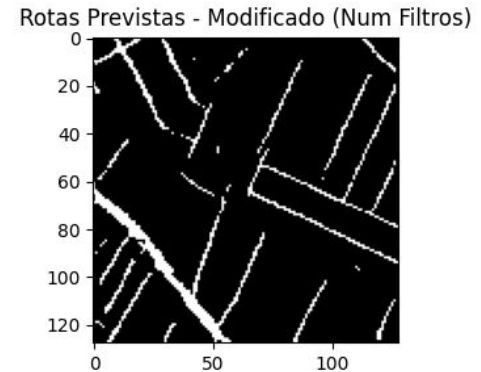
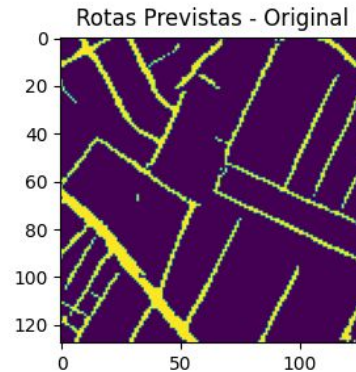
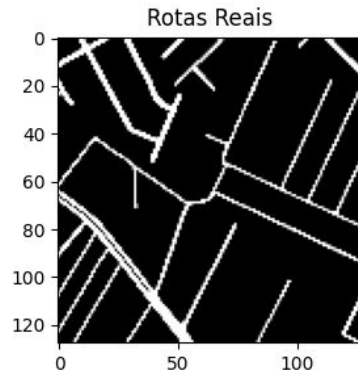
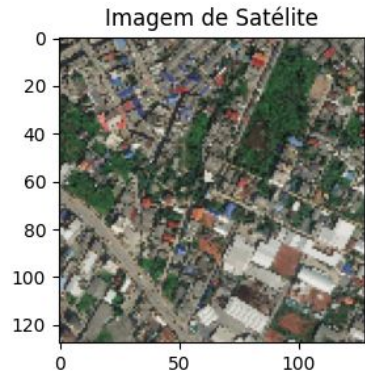
Metodologia

ETAPA 6 – Aumentando o número de filtros



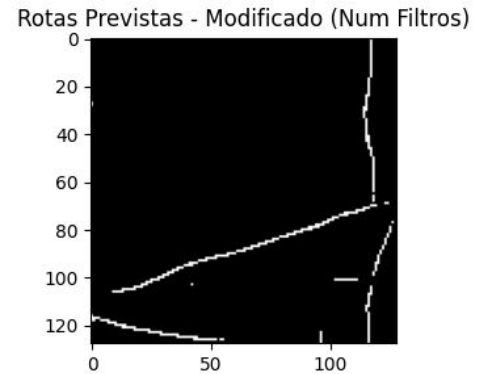
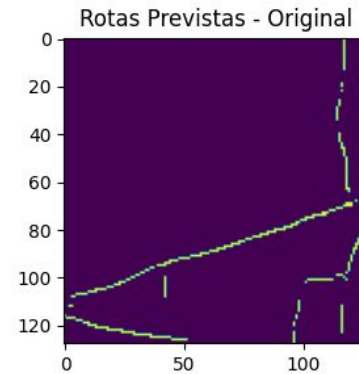
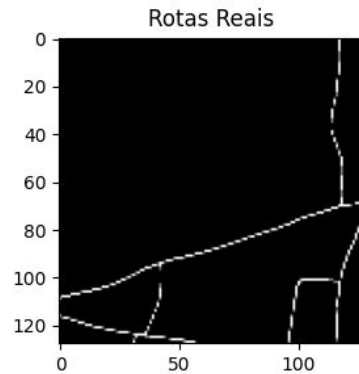
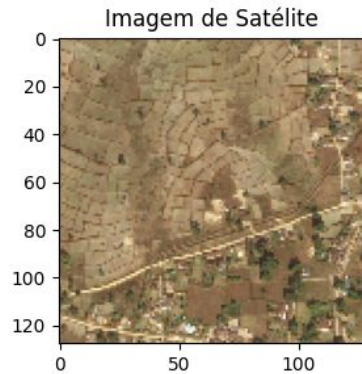
Metodologia

ETAPA 6 – Aumentando o número de filtros



Metodologia

ETAPA 6 – Aumentando o número de filtros



Resultados

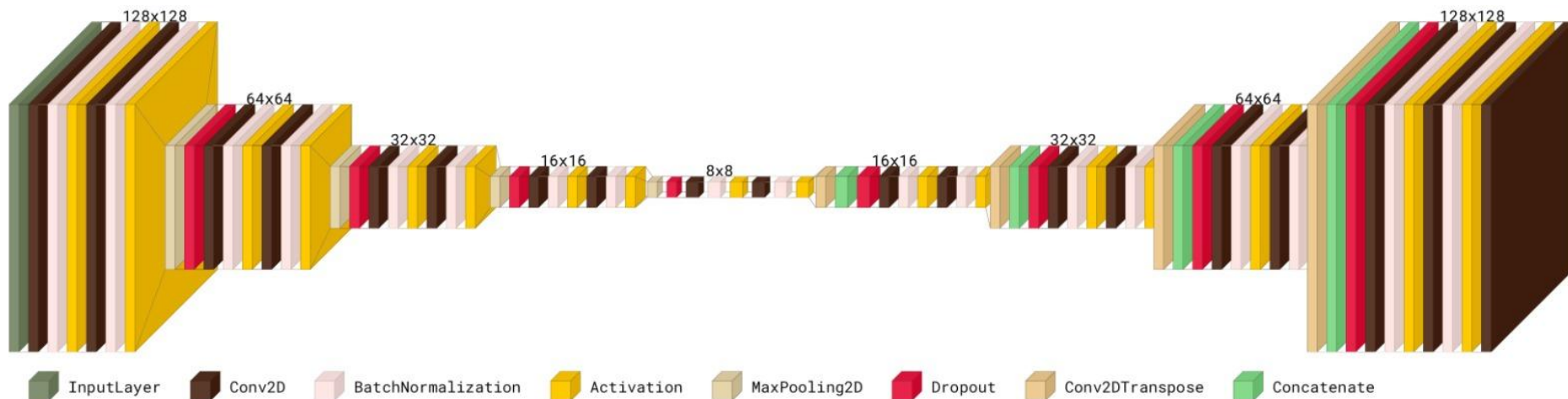
Sugestões

- Diminuir o número de épocas;
- Aumentar o número de camadas de convolução;
- Modificar a função de ativação;
- Utilizar as imagens em escala de cinza;
- Aplicar filtros.

Resultados

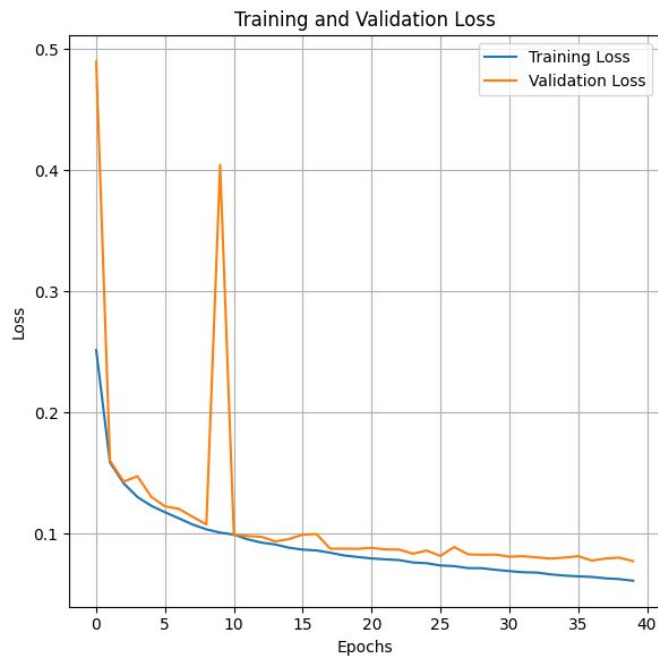
Estrutura da rede

- Parâmetros totais: 8.642.273



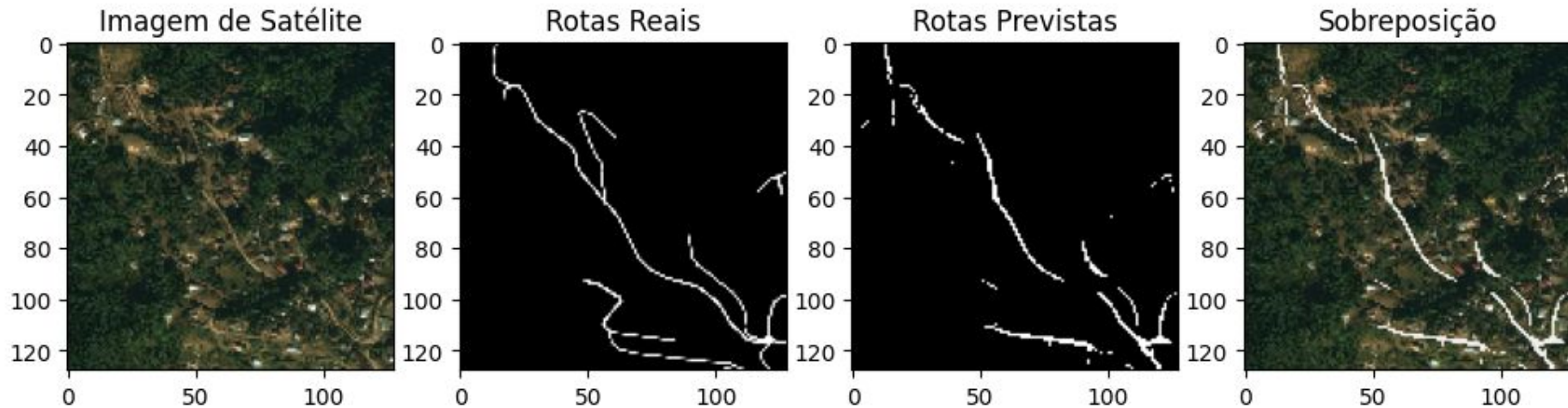
Resultados

Métricas



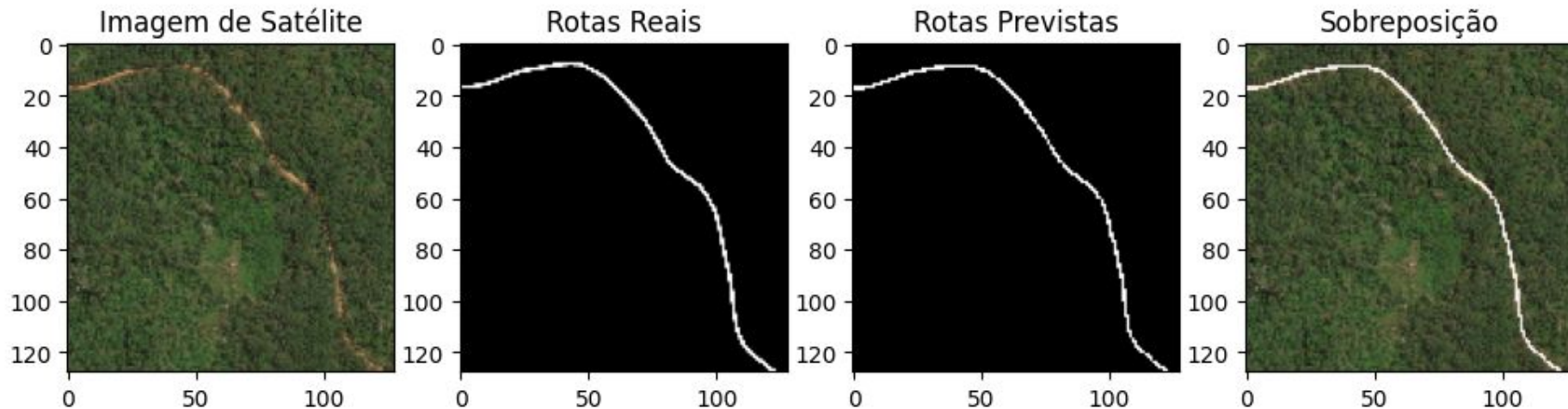
Resultados

Modelo com validação



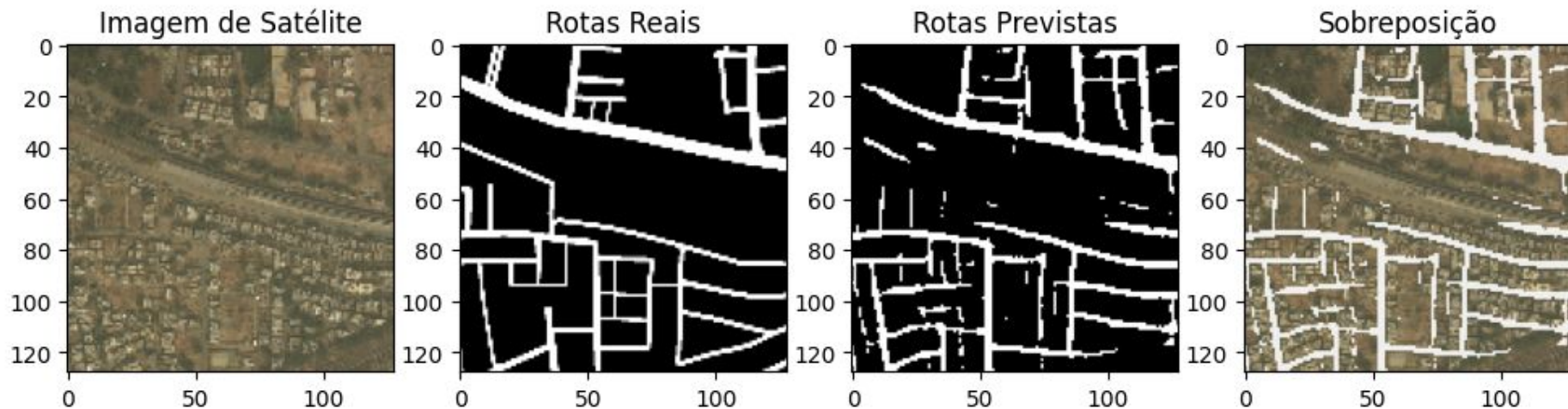
Resultados

Modelo com validação



Resultados

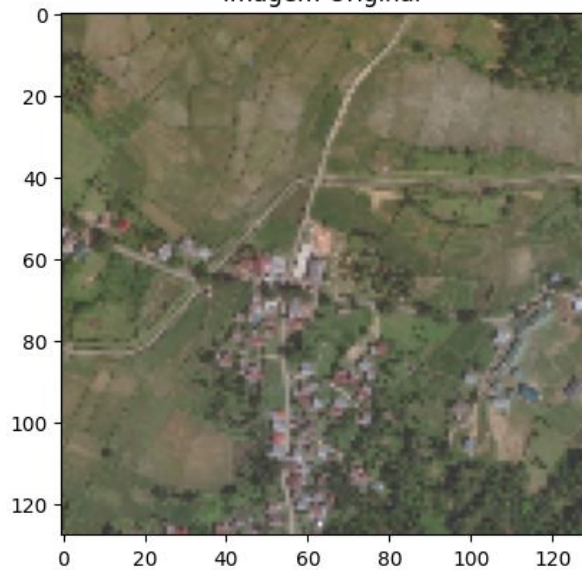
Modelo com validação



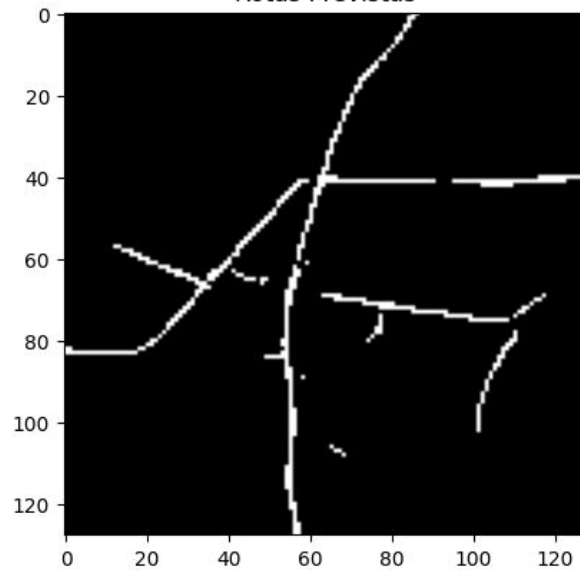
Resultados

Testes

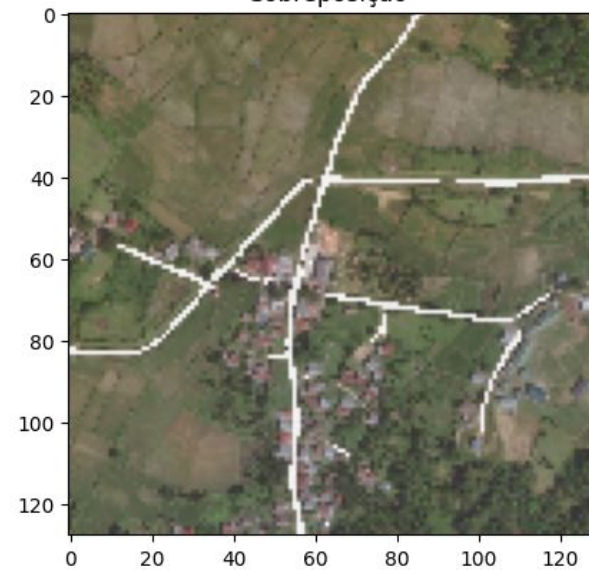
Imagem Original



Rotas Previstas



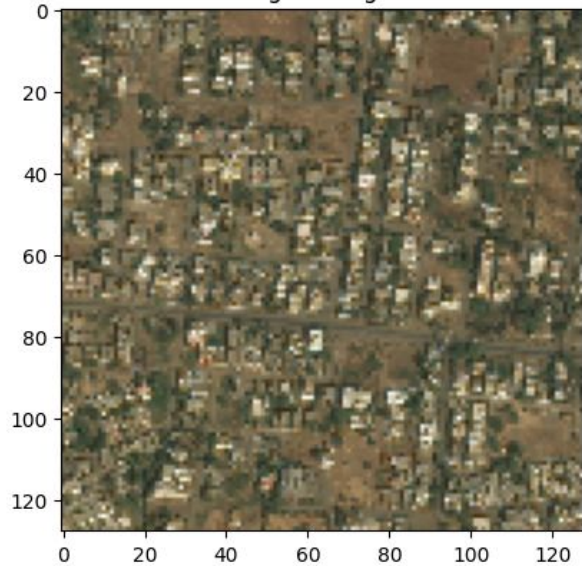
Sobreposição



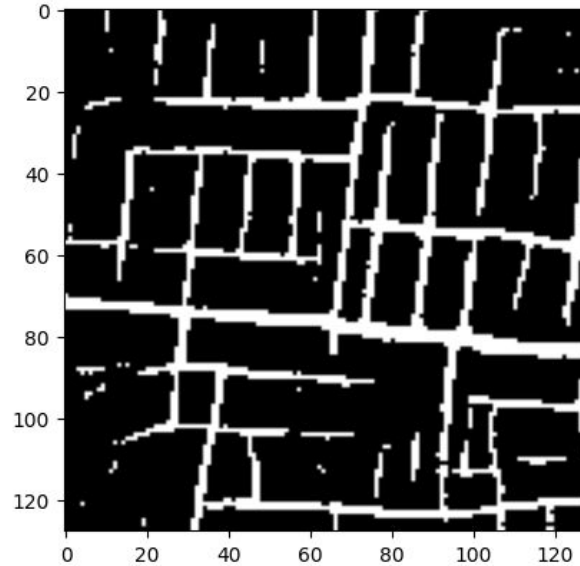
Resultados

Testes

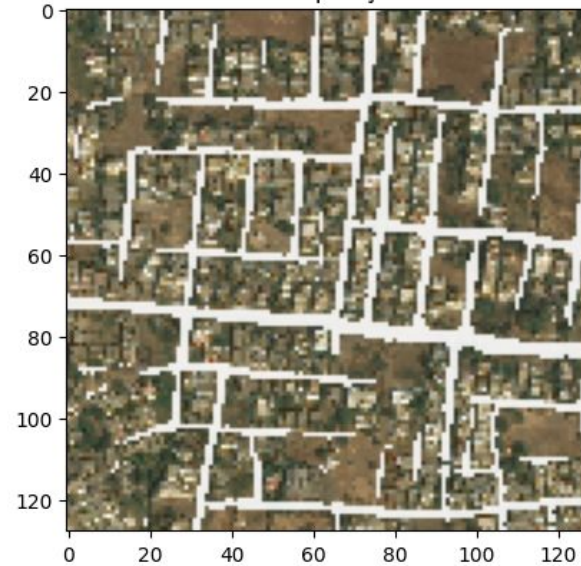
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Rotas Previstas



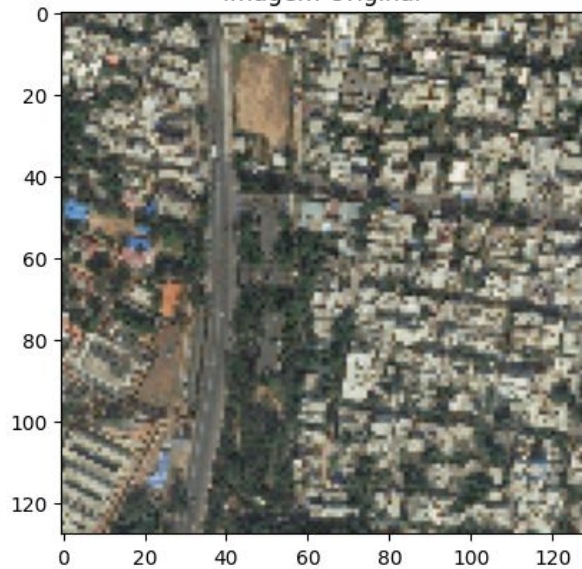
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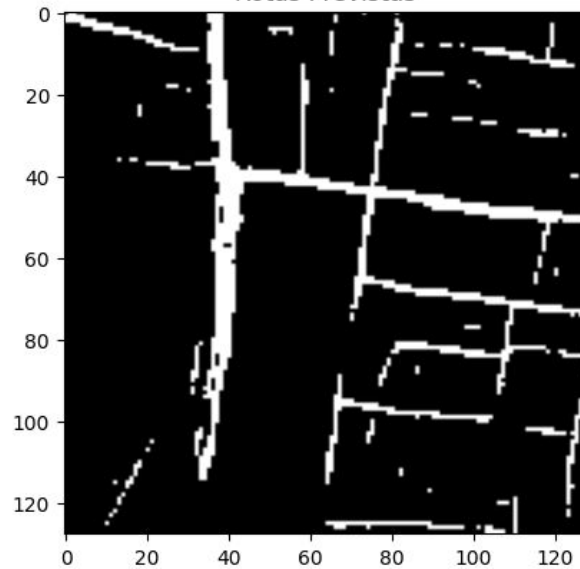
Resultados

Testes

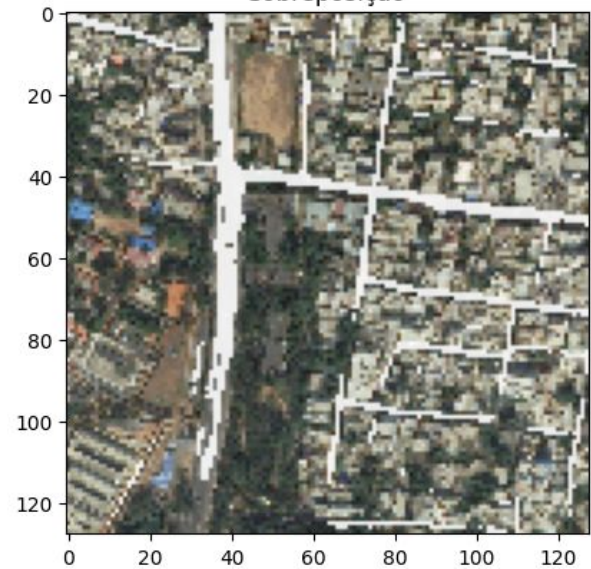
Imagem Original



Rotas Previstas



Sobreposição



Conclusões

- Foi atestado que os arquivos estão em estado de análise e uso para treinamento e teste;
 - Imagens de satélite: .jpg
 - Imagens de máscara: .png
 - Dimensões das imagens: 1024px X 1024px
- Não foi necessário classificar os arquivos por não ser um problema de classificação;
- É inconclusivo se o modelo possui capacidade de discernir diferenças entre rodovias e ferrovias nas imagens;

Conclusões

- Imagens muito grandes podem ser um obstáculo para treinamento de modelos de segmentação. É necessário alguma espécie de tratamento, especialmente em máquinas mais iniciais;
- Datasets robustos podem ser reduzidos a depender dos resultados obtidos;

Agradecemos a atenção!

Referências Bibliográficas

Seguir regras da ABNT NBR 10520