Task 1: Cityscapes Mask Conversion Report

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Objective

The goal is to convert Cityscapes dataset `labelIds` into:

- **Multiclass masks** with 19 training classes
- **Binary masks** for foreground vs background

Decisions Made

- Used predefined `labelIds` to trainId mapping for 19 semantic classes
- Ignored all non-mapped class IDs by setting them to 255
- Binary masks contain only 0 (background) and 255 (foreground)
- Added exception handling for corrupt or missing files

Folder Structure

```
Cityscapes/
    leftImg8bit/              # Original images
        train/
    gtFine/                   # Ground truth labelIds
        train/
    train_masks_multiclass/   # Output multiclass masks
    train_masks_binary/       # Output binary masks
```

Example Outputs

Figure 1: Original Image

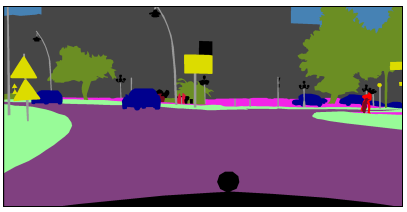

Figure 2: Multiclass Mask

Figure 3: Binary Mask

Reproducibility Instructions

1. Install `uv`

```
curl -Ls https://astral.sh/uv/install.sh | sh
# Add ~/.cargo/bin to PATH
```

2. Create Environment and Install Dependencies

```
uv venv .venv
source .venv/bin/activate
uv pip install -r requirements.txt
```

3. requirements.txt

```
numpy
pillow
tqdm
```

4. Run the Script

```
python mask_generator.py
```

For binary masks:

```
python mask_generator.py --mode binary --output_dir Cityscapes/
    train_masks_binary
```

Summary of Results

Mode	Classes	Shape	Values	Format
Multiclass	19 Classes	H × W	0–18, 255	8-bit PNG
Binary	Foreground only	H × W	0, 255	8-bit PNG

Table 1: Comparison of conversion modes

Future Enhancements

- Add CLI using `argparse`
- Visualize masks with colored palettes
- Add pixel count stats per class
- Write tests for validation