🧥 Clothing Segmentation System — Strengths, Drawbacks & Limitations

Model Used: SegFormer-B2 fine-tuned on the ATR Clothing Parsing Dataset
HuggingFace Model: mattmdjaga/segformer_b2_clothes

🚀 Strengths of the System

1. High Segmentation Accuracy on Major Clothing Categories

- Performs strongly on shirts, pants, coats, dresses, skirts, and hats.
- Produces clean and consistent segmentation masks.

2. Strong Global Understanding of Human Body Structure

- Transformer backbone captures long-range dependencies.
- Handles layered outfits, overlapping clothes, and complex shapes.

3. Robust Across Different Poses

- Works well on standing, walking, and semi-side-view images.
- Maintains segmentation quality with varying body orientations.

4. Efficient and Fast (CPU)

- Lightweight architecture enables fast inference.
- Suitable for use in Streamlit applications and real-time demos.

✕ Drawbacks of the System

1. Struggles with Small or Rare Clothing Items

- Limited performance on bags, scarves, sunglasses, and belts.
- These items are underrepresented in the ATR dataset.

2. Possible Misclassification Between Similar Categories

- Coat vs jacket
- Skirt vs dress
- Pants vs jumpsuit
- Hair vs hat

3. Issues With Occlusion

- When clothes are partially hidden by new objects or other people, the model may:
  - Leave gaps

○ Predict wrong clothing labels

4. May Struggle With Images Containing Multiple Humans

- The model is trained mostly on single-person images (only ~700 images with more than one person).
- Multi-person images lead to incorrect segmentation or mixing labels.

5. Struggles When Clothes Are Occluded by New Objects (Not Human Body)

- Segmentation breaks when objects like bags, boxes, or furniture cover the clothes.

⚠ Limitations of the System

1. May Struggle With Missing Body Parts

- Cropped images where the legs, arms, or torso are missing significantly reduce segmentation quality.

2. Requires Good Image Resolution and Lighting

- Works best with clear, high-resolution, well-lit images.

3. Cannot Segment Clothing Types NOT in the ATR Label List

Examples not supported:

- Gloves
- Jewelry
- Watches
- Cultural wardrobe types (e.g., abaya, sari)
- Logos or patterns