Dressing in Order: Recurrent Person Image Generation for Pose Transfer, Virtual Try-On and Outfit Editing

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Dressing in Order for Multiple Tasks

- Virtual try-on: multiple layouts and multiple layers
Dressing in Order for Multiple Tasks

• Virtual try-on: **multiple layouts** and **multiple layers**
• Pose Transfer
• Outfit Editing

![Content Removal](image)

- **Pose transfer**
- Person
- Poses
- Transferred (ours)

![Print Insertion](image)

- Person
- Print
- Inserted (ours)

![Reshaping](image)

- Person
- Target shape
- Reshaped (ours)

![Texture Transfer](image)

- Person
- Source texture
- Transferred (ours)
**Background**: Virtual Try-On

- **Outfit Try-On: Garment Replacement**
  - Predefine a set of garment categories (e.g., top, bottom, skirts, etc)

(ADGAN, Y. Men et al. CVPR 2020)

**Limitations:**
- Only accept *one garment per category* $\Rightarrow$ No layering
- Only generate *one layout per set of garments* $\Rightarrow$ Users can’t control layout
**Background**: Pose Transfer

- Transfer a person from pose A to pose B, while keeping the identity

*(GFLA, Y. Ren et al. CVPR 2020)*
Dressing in Order: A Recurrent Pipeline

- A recurrent mechanism for layering garments
**Dressing in Order:** A Recurrent Pipeline

- A recurrent mechanism for layering garments

![Diagram](image)
**Dressing in Order**: A Recurrent Pipeline

- A recurrent mechanism for layering garments

![Diagram of the dressing order pipeline](image)
Dressing in Order for Pose Transfer

- Transfer pose by control pose input
**Dressing in Order: A Recurrent Pipeline**

- A **recurrent mechanism** for layering and switching dressing order

**Target Pose**

```
Body  Garment 1  Garment 2  Garment 3  Garment 4  Garment 5
```

Target Pose

```
G_body  E_body  G_dec
```

```
G_gar  E_gar  G_dec
```

```
G_dec
```

```
Turking in
```

```
.....
```
**Dressing in Order:** A Recurrent Pipeline

- A recurrent mechanism for layering and switching dressing order

![Diagram](image_url)
Outfit Editing: Reshaping

- Play with the separated shape/texture encodings
Outfit Editing: Texture Transfer

- Play with the separated shape/texture encodings
Outfit Editing: Content Removal

- Play with the separated shape/texture encodings
**Outfit Editing:** Print Insertion

- Insert a print as an additional “garment”
## Pose Transfer Performance

### User Study

<table>
<thead>
<tr>
<th>Compared Methods</th>
<th>Preferred others vs. ours</th>
</tr>
</thead>
<tbody>
<tr>
<td>GFLA (CVPR’20)</td>
<td>47.73% vs. <strong>52.27%</strong></td>
</tr>
<tr>
<td>ADGAN (CVPR’20)</td>
<td>42.52% vs. <strong>57.48%</strong></td>
</tr>
</tbody>
</table>

![Image of user study results]
Virtual Try-On Performance

User Study

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<tbody>
<tr>
<td>ADGAN (CVPR’20)</td>
<td>19.36% vs. 80.64%</td>
</tr>
</tbody>
</table>

(ADGAN, Y. Men et al. CVPR 2020)
Try-On Applications

Try-On with different Layouts

Layer inside vs. outside

Keep layering outside
Editing Applications

Texture Transfer

Input  Texture  Transferred

Reshaping

Input  Shape  Reshaped
Editing Applications

Content Removal

Input  Masked  Removed

Print Insertion

Input  Copy-and-paste  Inserted
Summary

• A **recurrent mechanism** to extend virtual try-on to **layering** and **switching dressing order**

• A **flexible framework** to support multiple tasks:
  • Pose transfer
  • Virtual try-on
  • Outfit editing

Project Page: [https://cuiaiyu.github.io/dressing-in-order](https://cuiaiyu.github.io/dressing-in-order)
Code available: [https://github.com/cuiaiyu/dressing-in-order](https://github.com/cuiaiyu/dressing-in-order)