FS2K dataset

> Towards the translation between Face <--> Sketch.
>
> **Download** (photo+sketch+annotation): Google-drive, Baidu-disk.

Updates:

- 2021-08-31: FS2K Dataset is released!

Introduction:

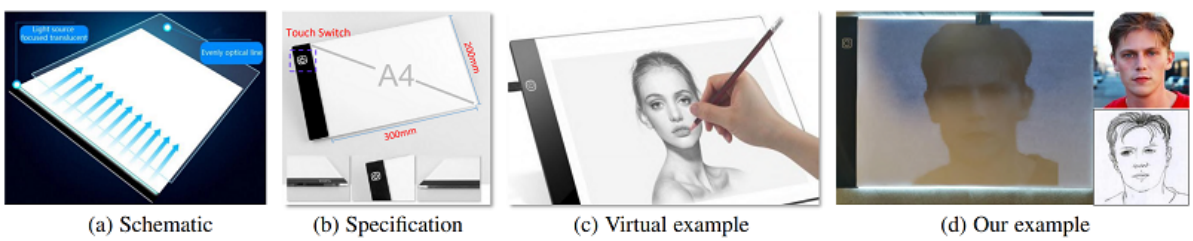
We elaborately build a new high-quality **Facial Sketch Synthesis** (FSS) dataset, termed **FS2K**. It is the largest publicly released FSS dataset, consisting of 2,104 (1,058+1,046) **image-sketch pairs** from a wide range of image backgrounds, skin colors, sketch styles, and lighting conditions. In addition, we also provide extra **attributes**, e.g., gender, smile, hair condition, etc., to enable deep learning models to learn more detailed cues. Finally, the sketches from FS2K are **drawn by professional artists** assisted by the guidelines and copy lights, which differs from all previous dataset. Thus, FS2K not only embedded the sketch style from artists but also the facial content from the photo.

Establishing the FSS dataset drawn by professional artists is more challenge than other face datasets, that is why the existing largest FSS dataset in the past 13 years has only ~1K images. Although the image scale is only ~2 times larger than CUFSF, we still spent 1 year to create such a high-quality dataset.

The structure of dataset you download should look as follows:

```
FS2K
├── photo
|       ├── photo1      (1,529, source: CASIA-WebFace)
|       ├── photo2      (98,    source: invited eight actors)
|       └── photo3      (477,   source: free stock photos websites,
including Unsplash, Pexels, Pngimg and Google)
├── sketch
|       ├── sketch1
|       ├── sketch2
|       └── sketch3
├── anno_test.json
├── anno_train.json
└── README.pdf
```

How we made it:



(a) Schematic (b) Specification (c) Virtual example (d) Our example

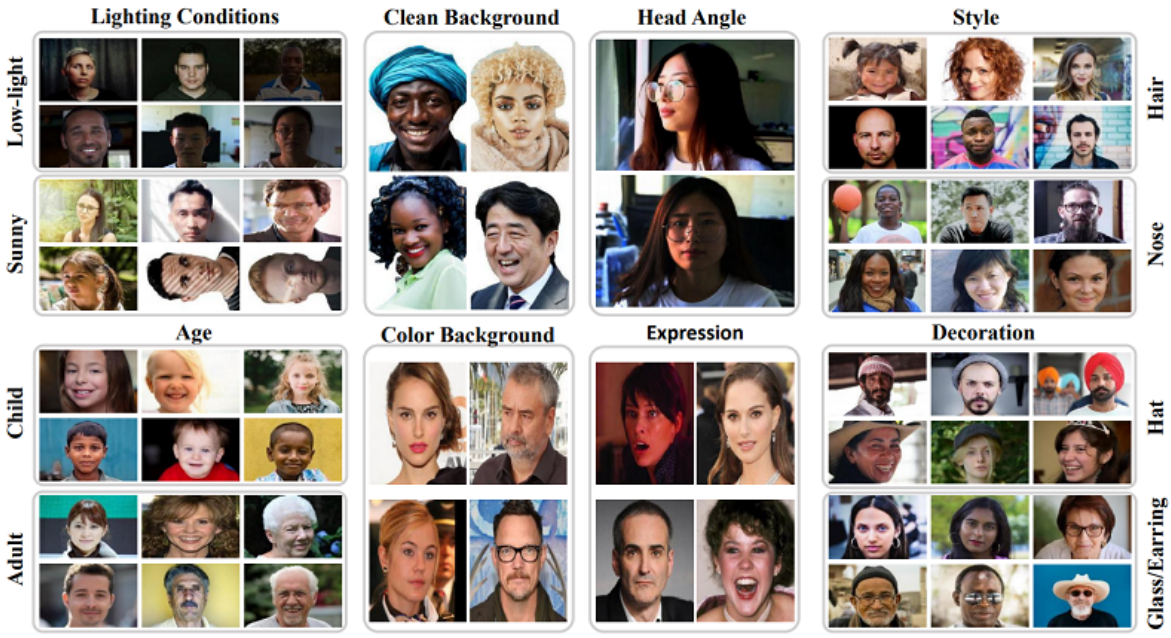
The use of the Copy Table and our example. Zoomed-in for the best view. See Sec. 3.2 for more details.

Diversity

> In order to make the dataset more comprehensive, we tried to keep a high level of diversity in our dataset.

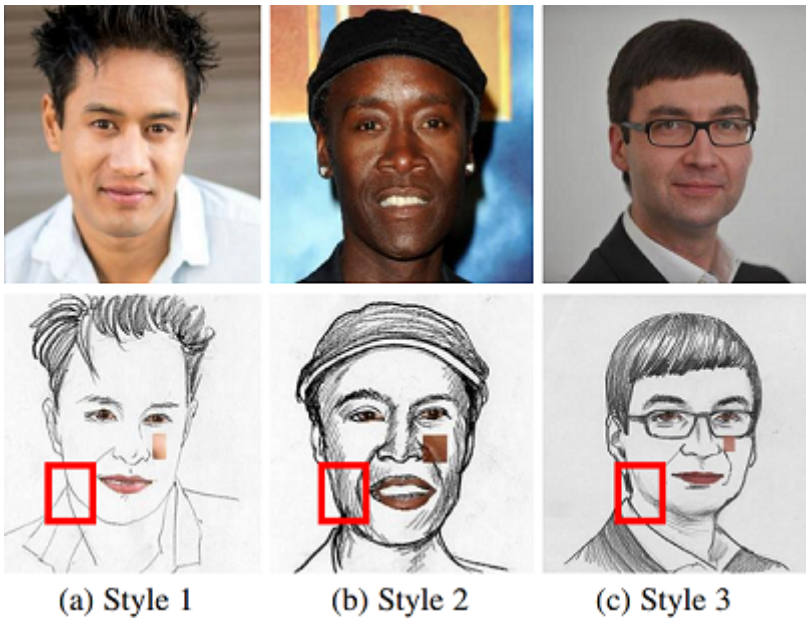
Photos

We collected the photos of various conditions, including lighting, background and age.



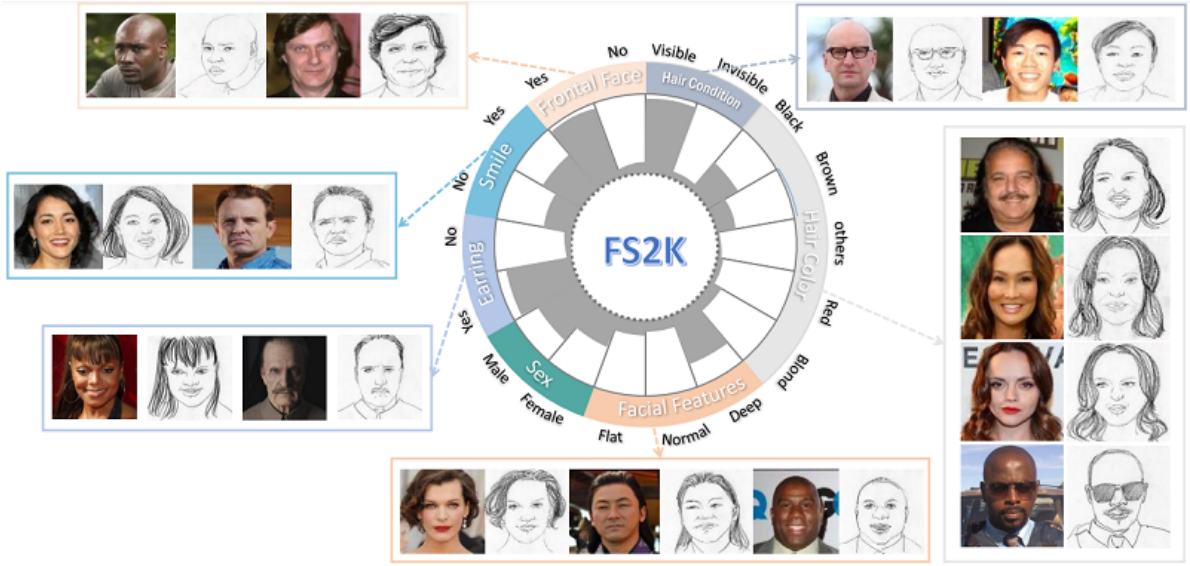
Sketches

In order to make the sketches have a style diversity, we asked the professional artists to draw these sketches in three different styles.



Attributes

> We collected several key attributes such as the hair color, smiling and gender as the annotations. These attributes could help further researches like conditional generation, .



Annotations

```
[{
    "image_name": "photo1/image0110",

    "skin_patch": [163, 139],
    # a point of face region.

    "lip_color": [156.97750511247443, 82.51124744376278, 79.0],
    # the mean RGB value of lip area.

    "eye_color": [118.65178571428571, 72.25892857142857, 69.59821428571429],
    # the mean RGB value of eye area.

    "hair": 0,
    # 0: with hair, 1: without hair.

    "hair_color": 2,
    # 0: brown, 1: black, 2: red, 3: no-hair, 4: golden.

    "gender": 0,
    # 0: male, 1: female.

    "earring": 1,
    # 0: with earring, 1: without earring.

    "smile": 1,
    # 0: with smile, 1: without smile.

    "frontal_face": 1,
    # 0: head rotates within 30 degrees, 1: > 30 degrees

    "style": 0
    # Style = one of {0, 1, 2}, please refer to the sketch samples.
},
...
]
```

Attributes Count

FS2K	w/ H	w/o H	H(b)	H(bl)	H(r)	H(g)	M	F	w/ E	w/o E	w/ S	w/o S	w/ F	w/o F	S1	S2	S3
Train	1010	48	288	423	60	239	574	484	209	849	645	413	917	141	357	351	350
Test	994	52	291	417	44	242	632	414	187	859	670	376	872	174	619	381	46

- H = **Hair Visible** or not.
- H (b / bl / r / g) = **Hair color** is brown / black / red / golden.
- **Gender**: Male / Female.
- E = With **Earring** or without Earring.
- S = With **Smile** or without Smile.
- F = **Frontal Face** or Face > 30 degrees.
- S (1 / 2 / 3) = **Style**1 / Style2 / Style3.

Tools

- Run `tools/vis.py` to visualize the photo-sketch pair with attributes.
- Run `tools/check.py` to check the count of all attributes in training set and test set.

Comparison with other FSS datasets

Dataset	Year	Pub.	Total	Train	Test	Attributes	Public	Paired
CUFS	2009	TPAMI	606	306	300	×	√	√
IIIT-D	2010	BTAS	231	58	173	×	×	√
CUFSF	2011	CVPR	1,194	500	694	×	√	√
VIPSL	2011	TCSVT	1,000	100	900	×	×	√
DisneyPortrait	2013	TOG	672	-	-	×	×	√
UPDG	2020	CVPR	952	798	154	×	×	√
APDrawing	2020	TPAMI	140	70	70	×	×	×
FS2K (OUR)	2021	Submit	**2,104**	**1,058**	**1,046**	√	√	√

Experiments

Face2Sketch:

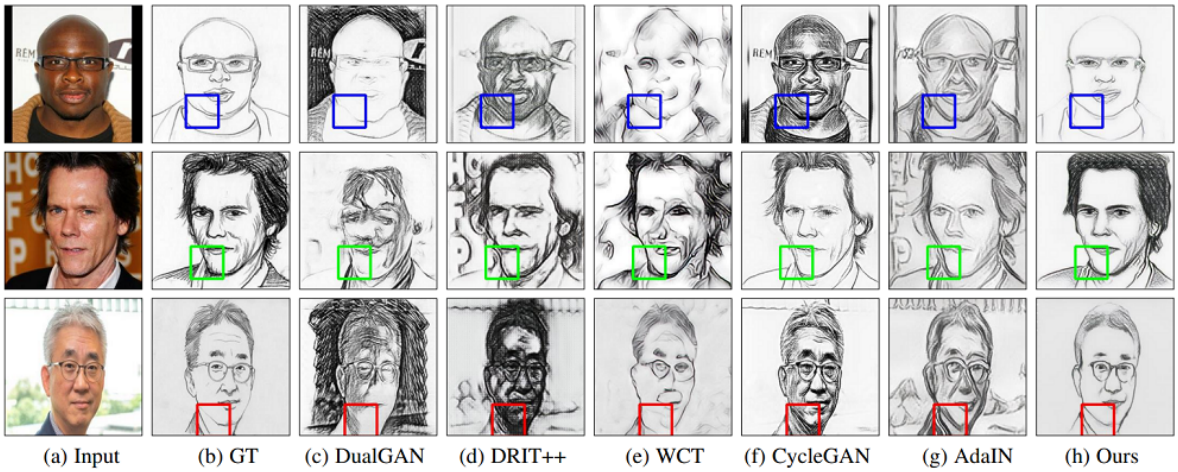


Fig. 8. From left column to right column: input face, ground truth (GT), DualGAN [165], DRIT++ [80], WCT [145], CycleGAN [10], AdaIN [141], and our FSGAN. We mark three styles with a blue, green, and red box for each result. Zoom-in for details.

Sketch2Face:

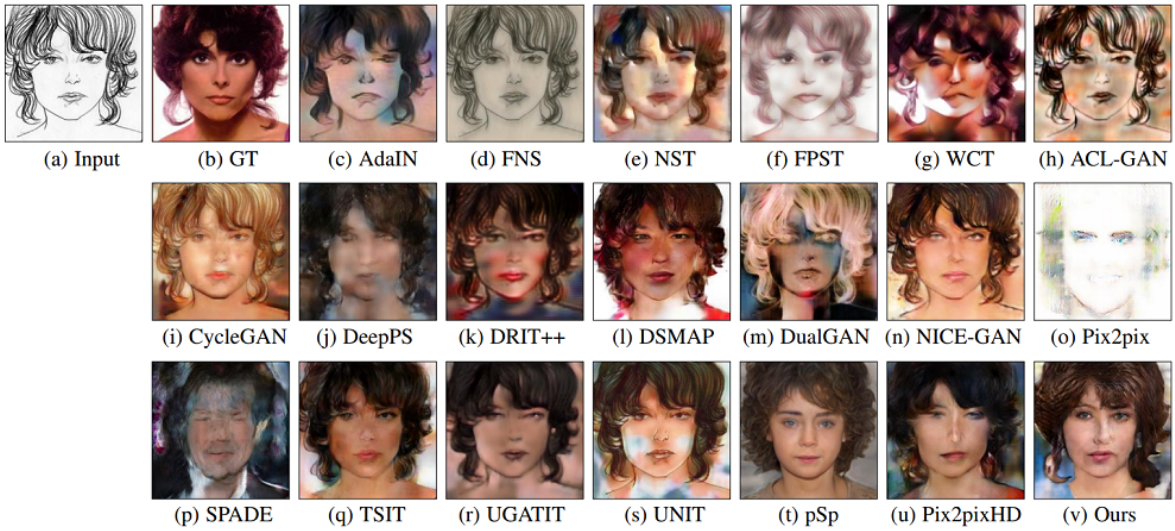


Fig. 11. We select 19 classical models including AdaIN [141], FNS [128], FPST [132], WCT [145], ACL-GAN [191], CycleGAN [10], DeepPS [221], DRIT++ [80], DSMAP [190], DualGAN [165], NICE-GAN [17], Pix2pix [19], SPADE [81], TSIT [189], UGATIT [18], UNIT [169], pSp [163], Pix2pixHD [12] for qualitative comparison.

Evaluation:

Benchmark results, toolbox, models and datasets will be found at http://dpfan.net/FS2KBenchmark.

Contact

This dataset is maintained by Dengping Fan (IIAI, dengpfan@gmail.com).

Citation

```
Paper will be publicly available soon.
```