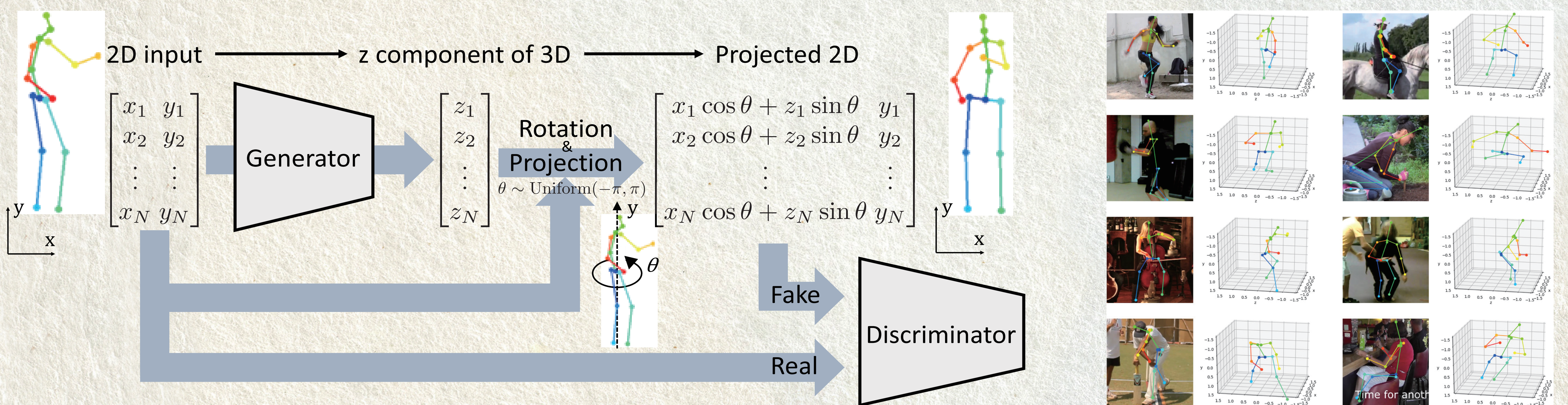# Unsupervised Adversarial Learning of 3D Human from 2D Joint Locations [arXiv]

Background

Many research focus on estimating 2D human pose.

- Our aim is 3D human pose estimation from a single image.

Existing methods require 3D datasets for training, and there are no 3D datasets captured in the wild.

- Our aim is learning a 3D human pose without any 3D datasets.

Method

Estimate a depth of each joint from 2D pose

- Train feed-forward networks which estimate the depth from use 2D pose. 2D pose is from [Cao 2017].

Adversarial training with 2D pose discriminator

- Real data are from 2D pose dataset.
- Fake data are projections of estimated 3D pose from other viewpoints.
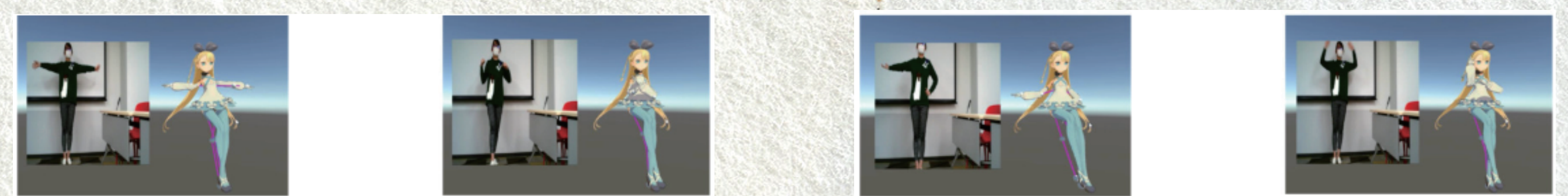
Pose Estimation Model Detail

Dataset

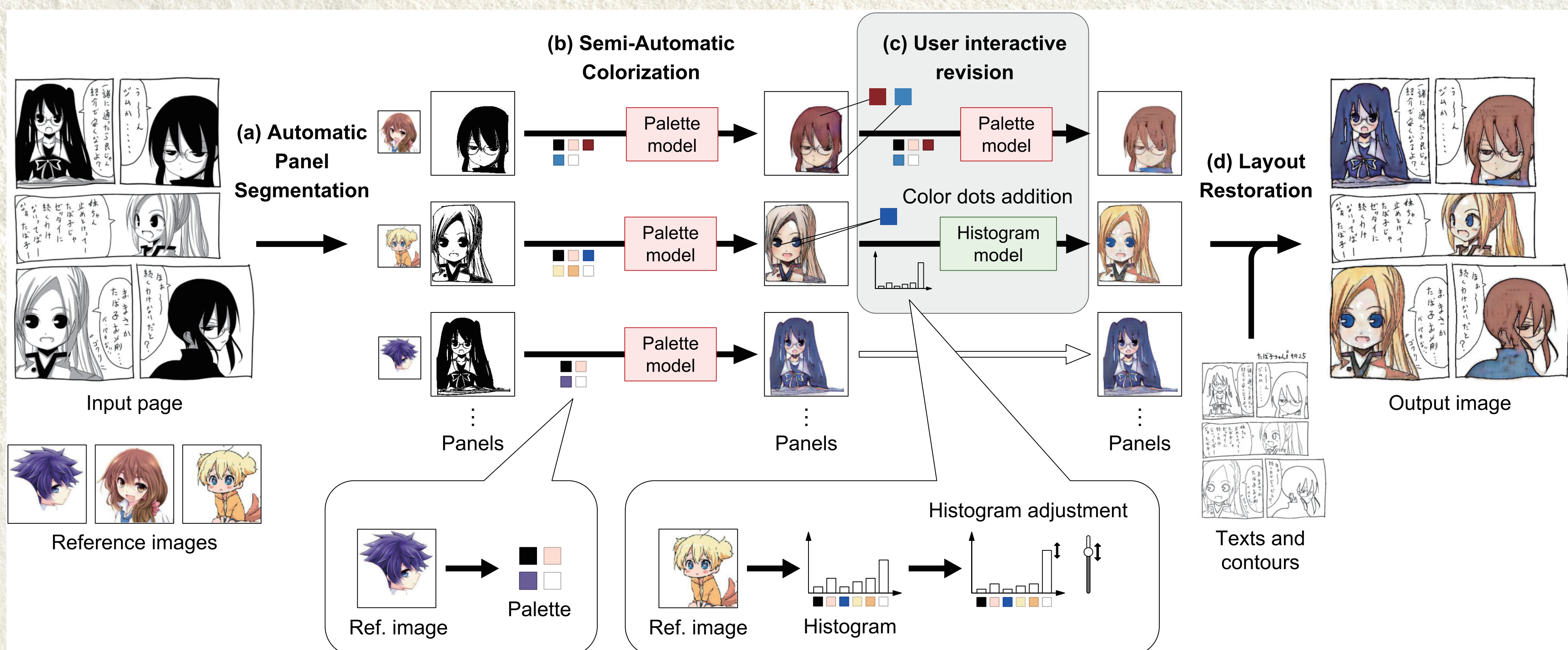- Human3.6M or MPII dataset

Training

- Feed-forward networks based on [Martinez 2017]

Application

Using this reserach, 3D character can be posed from a single photo. We have implemented our application for mobile devices on Unity.

Comicolorization: Semi-automatic Manga Colorization [SIGGRAPH ASIA 2017]

Background

Many reseach focus on colorizing an illustration.

- Our aim is the colorization of an entire manga title (a set of manga pages).

Some existing colorization methods suffer from the "color ambiguity problem".

- Our aim is to generate a plausible color version of the manga using reference images.

Method

Accomplish a colorization of a page by 3 steps

- Panel segmentation, Panel colorization, Layout restoration

Use color features from reference images

- To colorize the same character across multiple panels by the same color composition

Can revise the color by feeding color dots

- Accomplish colorization of the entire manga using the desired colors for each panel

(a) Baseline 1   (b) Baseline 2   (c) Our Method

Cannnot decide the color of hair using existing methods.

Colorization Network Model Detail
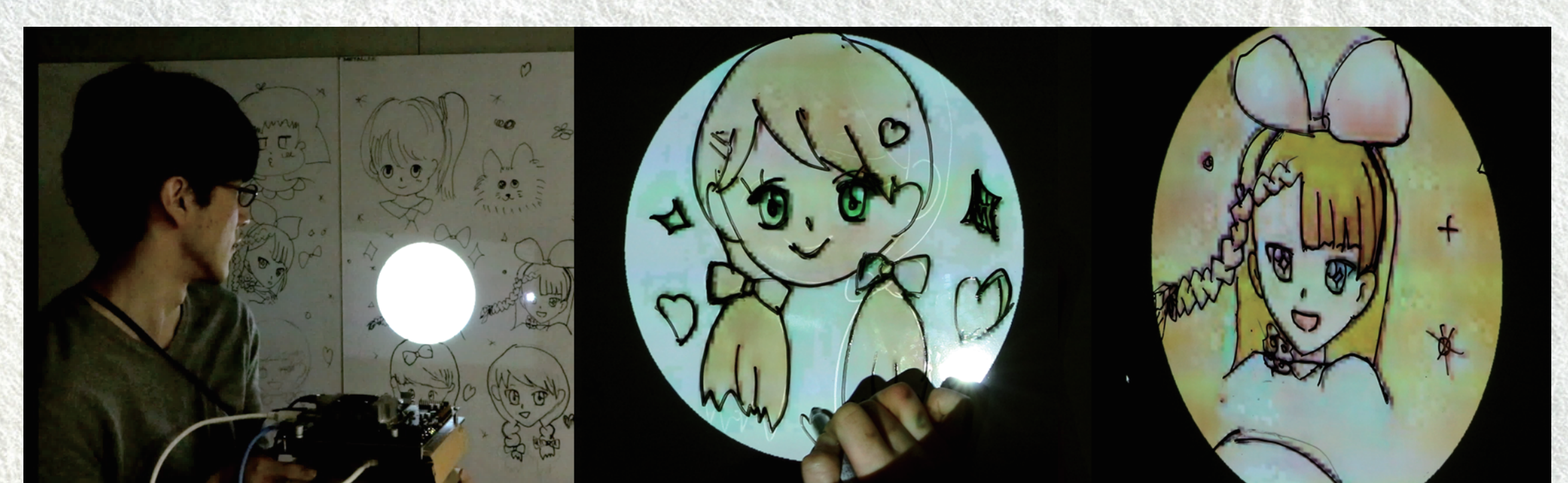
Dataset

- 160,000 color illustrations from niconico-seiga

Training

- Use convolutional encoder-decoder network based on [Iizuka 2016]
- Use color features from reference images as additional input to CNN
- Use additional adversarial loss for vivid colorization

Application

Using this research, pictures in the real world can be colorized. We made a handmade controller which is stuck NVIDIA Jetson TX1 on a mobile projector, then we projected the colorization result of a captured picture on a wall or manga while using this controller.

References

[Cao2017] Cao, Z., Simon, T., Wei, S.E., Sheikh, Y. *Realtime multi-person 2d pose estimation using part affinity fields* In: CVPR. (2017)

[Martinez 2017] Martinez, J., Hossain, R., Romero, J., Little, J.J. *A simple yet effective baseline for 3d human pose estimation* In: ICCV. (2017)

[Iizuka 2016] Satoshi, I*., Edgar S-S*., Hiroshi I. *Let there be Color!: Joint End-to-end Learning of Global and Local Image Priors for Automatic Image Colorization with Simultaneous Classification* In: SIGGRAPH. (2016)