LSI Medience Corporation

Analysis of monkey pose estimation using deep learning.

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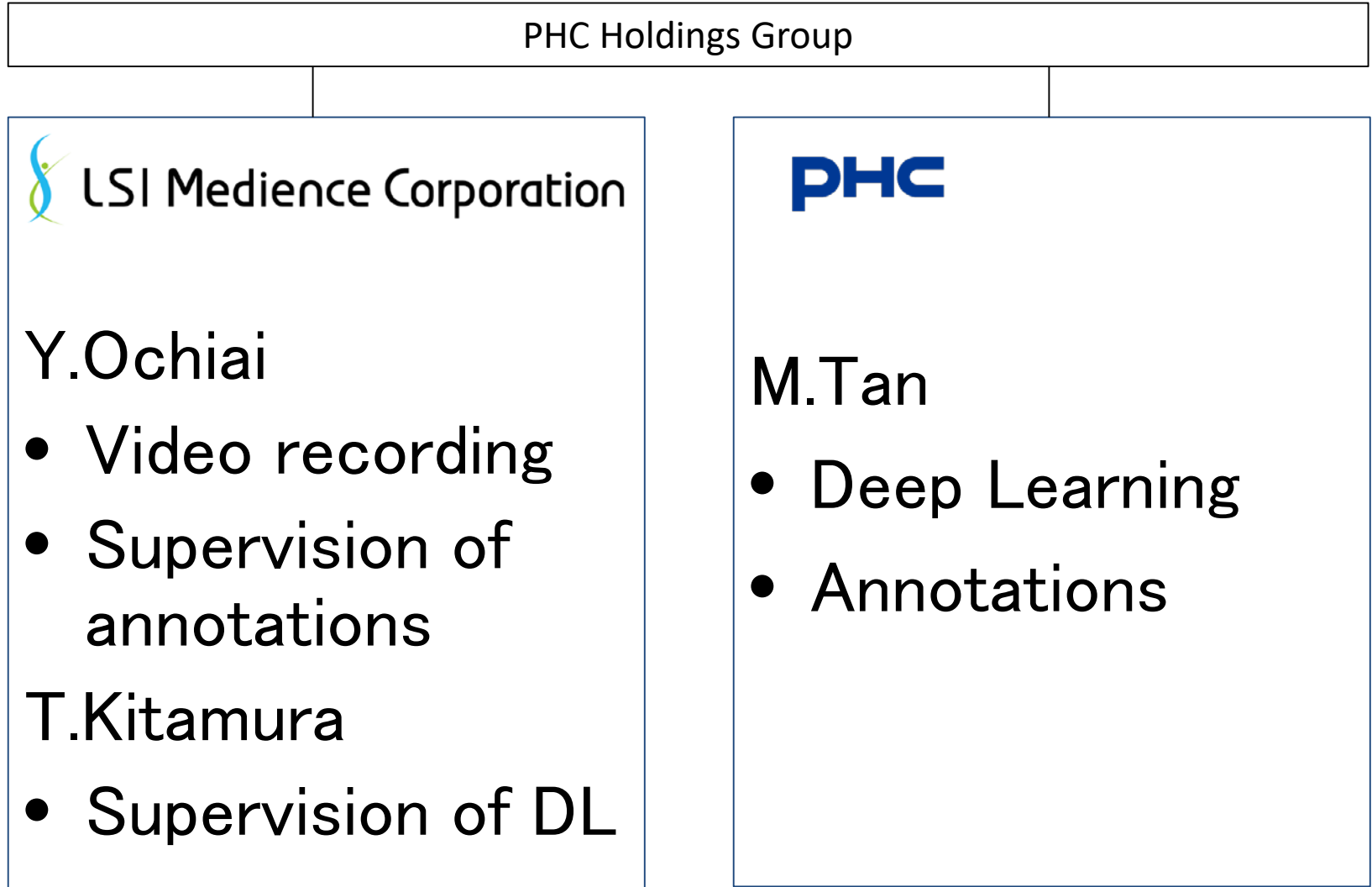
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Purpose

- The goal of this study is to develop a deep learning model that can classify toxic features such as changes in activity level, abnormal posture, ataxia, vomiting and nausea from videos recorded for a long period of time in normal cages with a shield.

- As a preliminary step, we herein report on monkey pose estimation.

Project structure

PHC Holdings Group

LSI Medience Corporation

Y.Ochiai

- Video recording
- Supervision of annotations

T.Kitamura

- Supervision of DL

PHC

M.Tan

- Deep Learning
- Annotations

Related Work

Condition

- Our regular breeding condition.
  - ➢ Monkey in cage.
    - ✓ Cage make pose estimation difficult.
    - ✓ Monkey is so curious that he touch the camera.
    - ✓ For long time recording.

Approach

- RGB and Depth Camera
  - ➢ Active IR Stereo
  - ➢ The active IR camera can shoot dark areas in the back of the cage.

Dataset

- Still images cut out from RGB + depth videos were clustered by image pattern, and still images were selected evenly from each cluster.

- Clustered image number: 100,000

- Annotated image number: 150

  ➢ Training image number: 83

  ➢ Test image number: 21

- Annotation: head, collar(neck), left hand, right hand, left foot, right foot.

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Network structure

Input: RGB image   Input: depth image

HRNet   HRNet
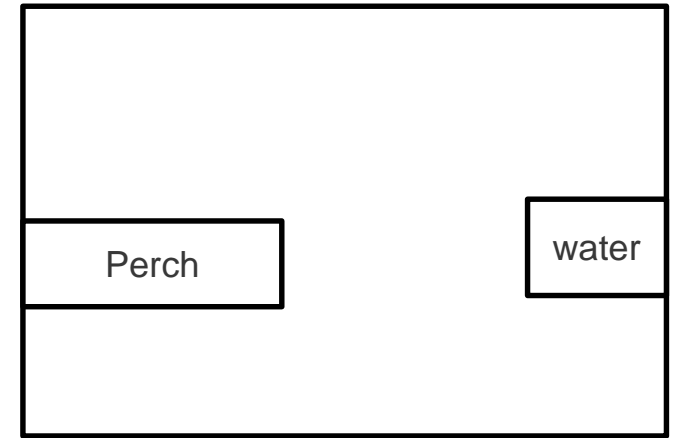
concatenate

Deconvolution*2   Deconvolution *2

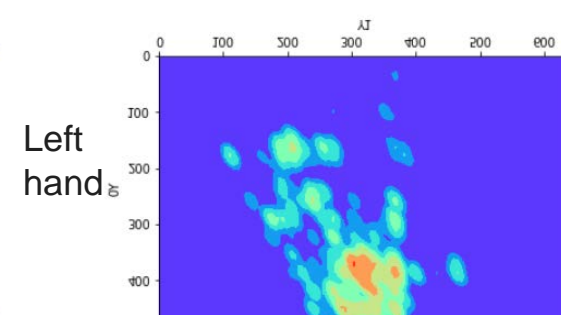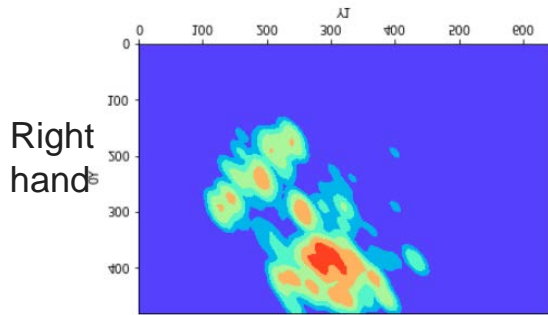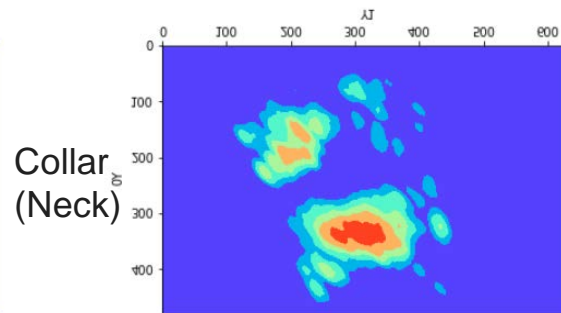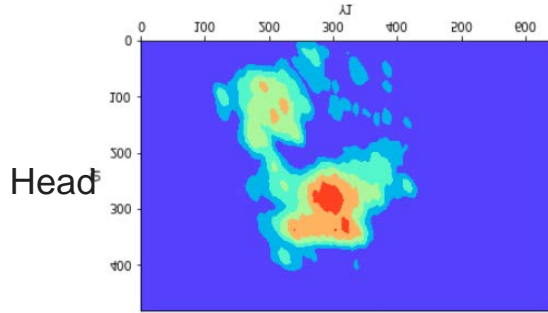Positions of parts

Head

Collar
(Neck)

Positions of bones

Head to
Collar
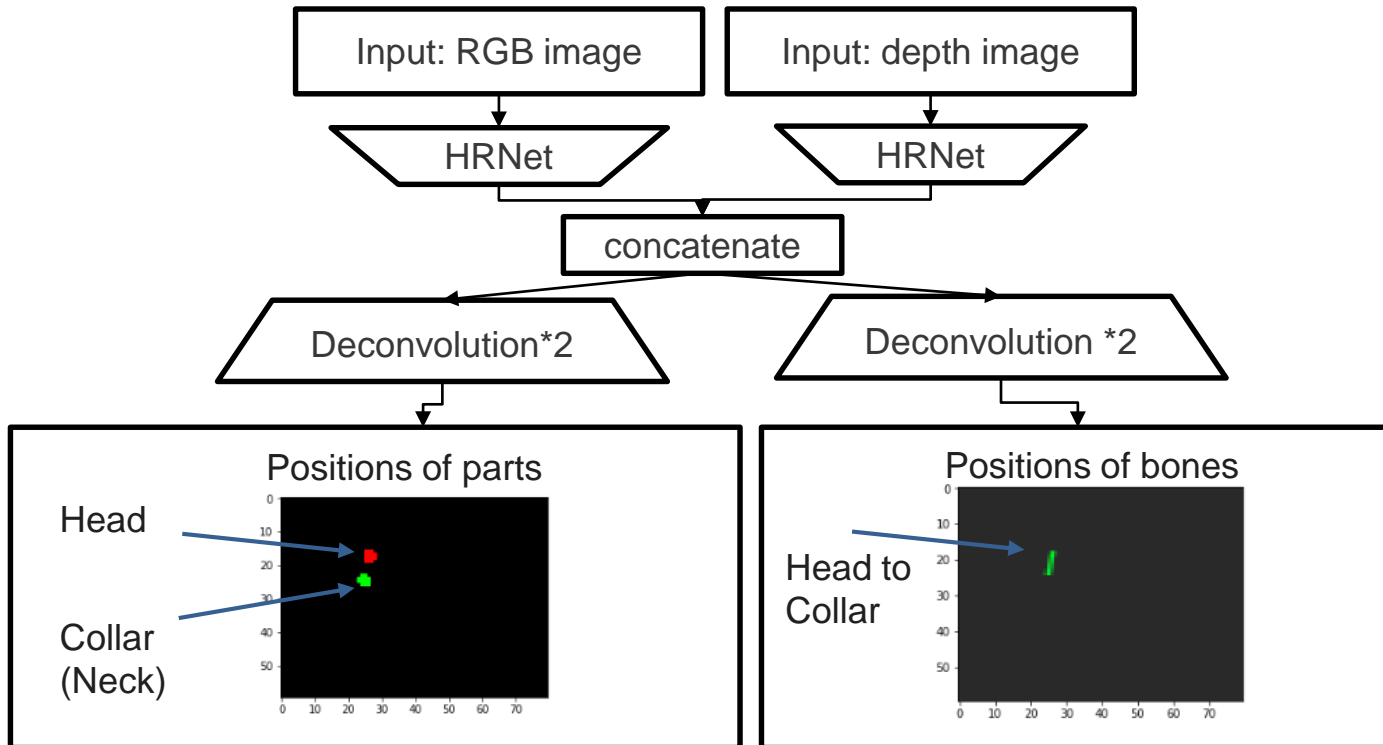
Result

- Test accuracy: 94% (In the same individual)

Result
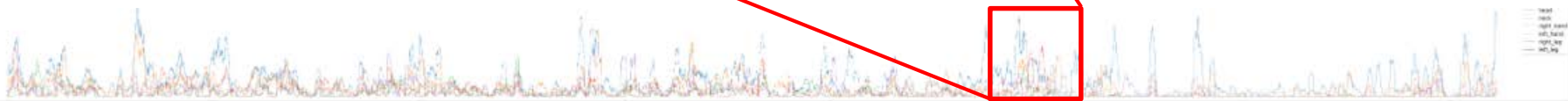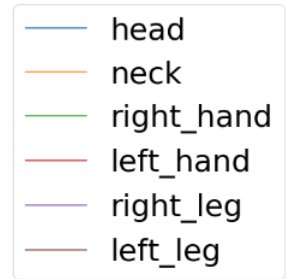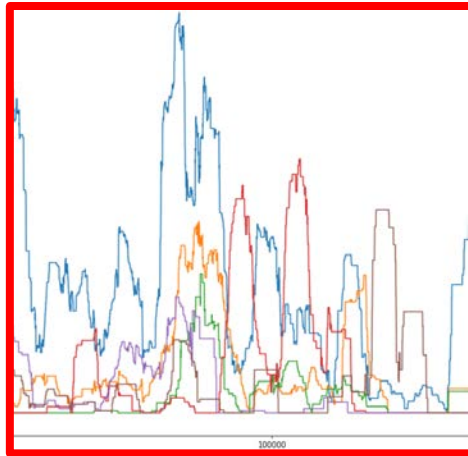## Heat map for parts position（log scale）

Head

Collar (Neck)

Right hand

Left hand

Right foot

Left foot

Perch

water

For 1.34 hour

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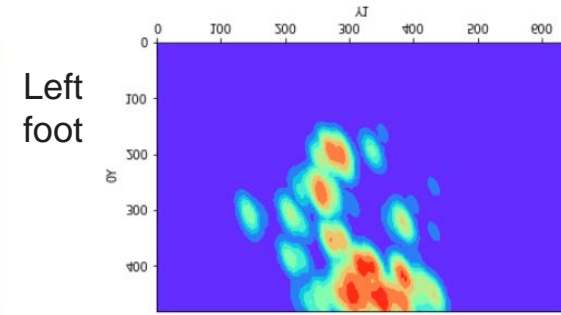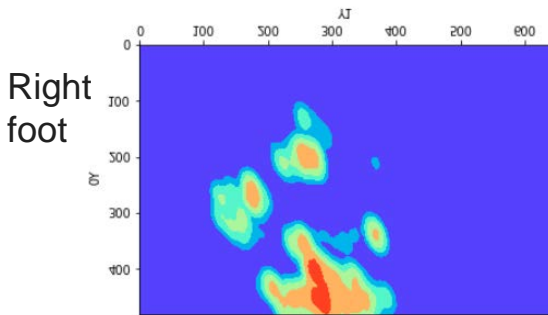
Result: Amount of movement

Point is moving average of
30 sec

| head |
| neck |
| right_hand |
| left_hand |
| right_leg |
| left_leg |

For 1.34 hour

Conculusion

- It is possible to estimate the posture in normal cage for several hours with a model that has learned the annotation of 150 images.

- Momentum can be analyzed.

Feature plan

- Pose estimation for multiple monkeys.
- Detection of side effects of drugs that act on the nervous system.