

# ML for Denoising

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# Structure

```
.
├── cell
│   └── Cell1_S1.tif
├── pre.txt
├── Prof._Lee_Research
│   ├── Denoising 1_2.pptx
│   └── Process
│       └── Particle P1_C1_S1_11
│           ├── _BD_Contrast.eps
│           ├── Cell1_S1_frameRange20_Particle P1_C1_S1_11.tif
│           └── Cell1_S1_ParticleP1_C1_S1_11_frameRange20_X685_Y660_Coords.xlsx
├── Cell1_S1_ParticleP1_C1_S1_11_frameRange20_X685_Y660_ROI.tif
├── _ContrastDiff.eps
├── _Contrast.eps
├── _ContrastNorm.eps
├── _Displacement.eps
├── _Frame1.eps
├── _Frame1RawROI.eps
├── _Overlay.eps
├── _OverlaySmooth.eps
├── _OverlayZoom.eps
├── _OverlayZoomSmooth.eps
├── Parameters.xlsx
├── _PathFull.eps
├── _PathFullSmooth.eps
├── _PathROI.eps
├── _PathROISmooth.eps
├── _positionX.eps
├── _positionY.eps
├── Result.xlsx
├── _SignalBrightDark.eps
└── _SignalMean.eps
```

5 directories, 27 files

# Structure (cont.)

```
Prof._Lee_Research/
├── cell
│   ├── Cell1_S1.tif
│   ├── Denoising_1_2.pptx
│   └── Process
│       ├── Particle P1_C1_S1_11
│       │   ├── annotated_frames
│       │   │   ├── png
│       │   │   │   ├── annotated_frame_100.png
│       │   │   │   ├── annotated_frame_101.png
│       │   │   │   ├── annotated_frame_102.png
│       │   │   │   └── annotated_frame_103.png
│       │   │   ├── .
│       │   │   ├── .
│       │   │   └── txt
│       │   │       ├── annotated_frame_100.txt
│       │   │       ├── annotated_frame_101.txt
│       │   │       ├── annotated_frame_102.txt
│       │   │       └── annotated_frame_103.txt
│       │   ├── .
│       │   ├── .
│       │   └── Cell1_S1_frameRange20_Particle P1_C1_S1_11.tif
│       ├── Cell1_S1_ParticleP1_C1_S1_11_frameRange20_X685_Y660_ROI.tif
│       │   ├── coords
│       │   │   └── Cell1_S1_ParticleP1_C1_S1_11_frameRange20_X685_Y660_Coords.xlsx
│       └── epsFiles
│           ├── _BD_Contrast.eps
│           ├── _ContrastDiff.eps
│           ├── _Contrast.eps
│           ├── _ContrastNorm.eps
│           ├── _Displacement.eps
│           ├── _Frame1.eps
│           ├── _Frame1RawROI.eps
│           ├── _Overlay.eps
│           ├── _OverlaySmooth.eps
│           ├── _OverlayZoom.eps
│           ├── _OverlayZoomSmooth.eps
│           ├── _PathFull.eps
│           ├── _PathFullSmooth.eps
│           ├── _PathROI.eps
│           ├── _PathROISmooth.eps
│           ├── _positionX.eps
│           ├── _positionY.eps
│           ├── _SignalBrightDark.eps
│           └── _SignalMean.eps
│       ├── frames
│       ├── parameters
│       │   ├── Parameters.xlsx
│       │   ├── Result.xlsx
│       └── result
│           └── Result.xlsx
└── 13 directories, 929 files
```

# ML Approach - Convolutional Neural Networks



# ML Approach (cont.)

- Objective: object tracking on ROIs
- Chloe's work acts as classification
- Need more data, ***301 frames just doesn't cut it***
  - The more data, the more accurate the object tracking
- After trained on one set, can scale for available data

# Looking forward

```
YOLOv8 Training
File Edit View Insert Runtime Tools Help All changes saved

+ Code + Text

train: WARNING ⚠ No labels found in /content/drive/MyDrive/Prof._Lee_Research/Process/Particle P1_C1_
train: New cache created: /content/drive/MyDrive/Prof._Lee_Research/Process/Particle P1_C1_S1_11/annotated_frames/png/train.cache
WARNING ⚠ No labels found in /content/drive/MyDrive/Prof._Lee_Research/Process/Particle P1_C1_S1_11/annotated_frames/png/train.cache, tr
albumentations: Blur(p=0.01, blur_limit=(3, 7)), MedianBlur(p=0.01, blur_limit=(3, 7)), ToGray(p=0.01, num_output_channels=3, method='weig
/usr/local/lib/python3.10/dist-packages/albumentations/__init__.py:24: UserWarning: A new version of Albumentations is available: 1.4.24 (
check_for_updates())
val: Scanning /content/drive/MyDrive/Prof._Lee_Research/Process/Particle P1_C1_S1_11/annotated_frames/png/val... 0 images, 61 backgrounds,
val: New cache created: /content/drive/MyDrive/Prof._Lee_Research/Process/Particle P1_C1_S1_11/annotated_frames/png/val.cache
WARNING ⚠ No labels found in /content/drive/MyDrive/Prof._Lee_Research/Process/Particle P1_C1_S1_11/annotated_frames/png/val.cache, train

Plotting labels to runs/detect/train5/labels.jpg...
zero-size array to reduction operation maximum which has no identity
optimizer: 'optimizer=auto' found, ignoring 'lr0=0.01' and 'momentum=0.937' and determining best 'optimizer', 'lr0' and 'momentum' automat
optimizer: AdamW(lr=0.001667, momentum=0.9) with parameter groups 57 weight(decay=0.0), 64 weight(decay=0.0005), 63 bias(decay=0.0)
TensorBoard: model graph visualization added ✓
Image sizes 1024 train, 1024 val
Using 0 dataloader workers
Logging results to runs/detect/train5
Starting training for 50 epochs...

Epoch  GPU_mem  box_loss  cls_loss  dfl_loss  Instances  Size
1/50    0G        0         289.1     0         0         1024: 100%|██████████| 17/17 [12:03<00:00, 42.54s/it]
      Class  Images  Instances  Box(P  R      mAP50  mAP50-95): 100%|██████████| 2/2 [00:53<00:00, 26.79s/it]
WARNING ⚠ no labels found in detect set, can not compute metrics without labels

Epoch  GPU_mem  box_loss  cls_loss  dfl_loss  Instances  Size
2/50    0G        0         265.1     0         0         1024: 6%|███| 1/17 [00:41<10:57, 41.06s/it]
```

Your session crashed after using all available RAM. [View runtime logs](#) ✕

hon 3 Google Compute Engine backend