Moedal ML: 13th Sep

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What Exists

Data

- ## DataSet of 441 gifs
  Fullsize images covering an entire foil. 8 Fresnel channels, backlit, halo

- ## Sub-Set of 2500 gifs
  Cropped 28x28 images, same size as MNIST, 8 channels.
  Not all labeled, or of regions of interest

Code

- ## Data-Collection from foil using smartscope routine. Can change parameters. (zoom)

- ## Scripts for renaming, converting, cropping

- ## TensorFlow code for creating 'tf.Datasets'
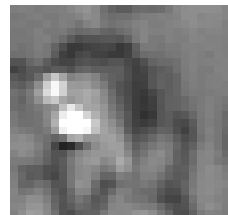
ML: Mini-Analysis

- Use 28x28 x8 pixel images

- Caputres moedal pit

- Same size as MNIST + 'fashion MNIST' canonical image classification examples

Challenges: *Short term*

LABELS

- Labelling
  ~400 images per foil
  ~400 small images

- Ie, 160,000 total
  to label from on foil

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- Temporary 'Get
  something out'
  approach.

BUGS

- Previous code for classifying w. flat images

- Was Stuck on bug with network, multichannel adaptation

- Found source – conflict w code / wrapper functions adapted from tf 1.5 vs newer tf1.9

- 2d / 3d conv non-trivial

  depth vs channels vs frames, hardcoded / optimised

Bug fixes / TF mechanics

- Update to newer 'canonical' ways of doing things. Keras, Layers, ..

- Much of which is designed to simplify / avoid / automate common errors

- Adapt work into more professional 'framework' type design, vs hacked together quicker – simpler - shorter

2d vs 3d image problem resolved
Convert to greyscale – swap frames vs channels – spoof 2d convoloution

Labelling

- ArXiv MinerVa paper on DCNNs / DANNs arXiv:1808.08332v1
- Provide work around for labelling shortage
- Auto-encoders mentioned last meeting

Domain Adversarial Neural Networks

- Can Augment unlabeled, unsupervised learning in one 'Domain' via transfer learning fro another

- Eg, train FCNN hole search over entire images, with training on small / cropped

- Source Domain, eg
  - Cropped images
  - Different Channels
  - Labels
- Target Domain
  - Unlabelled
  - Similar + Different
  - Low-res

Avenues

- Label with magified set
    - ML with low zoom

- Use Unsupervised techniques to accelerate labeling

- 'Off the shelf' Transfer learning / imagenet

- Auto-Encoders
    - Image segmentation