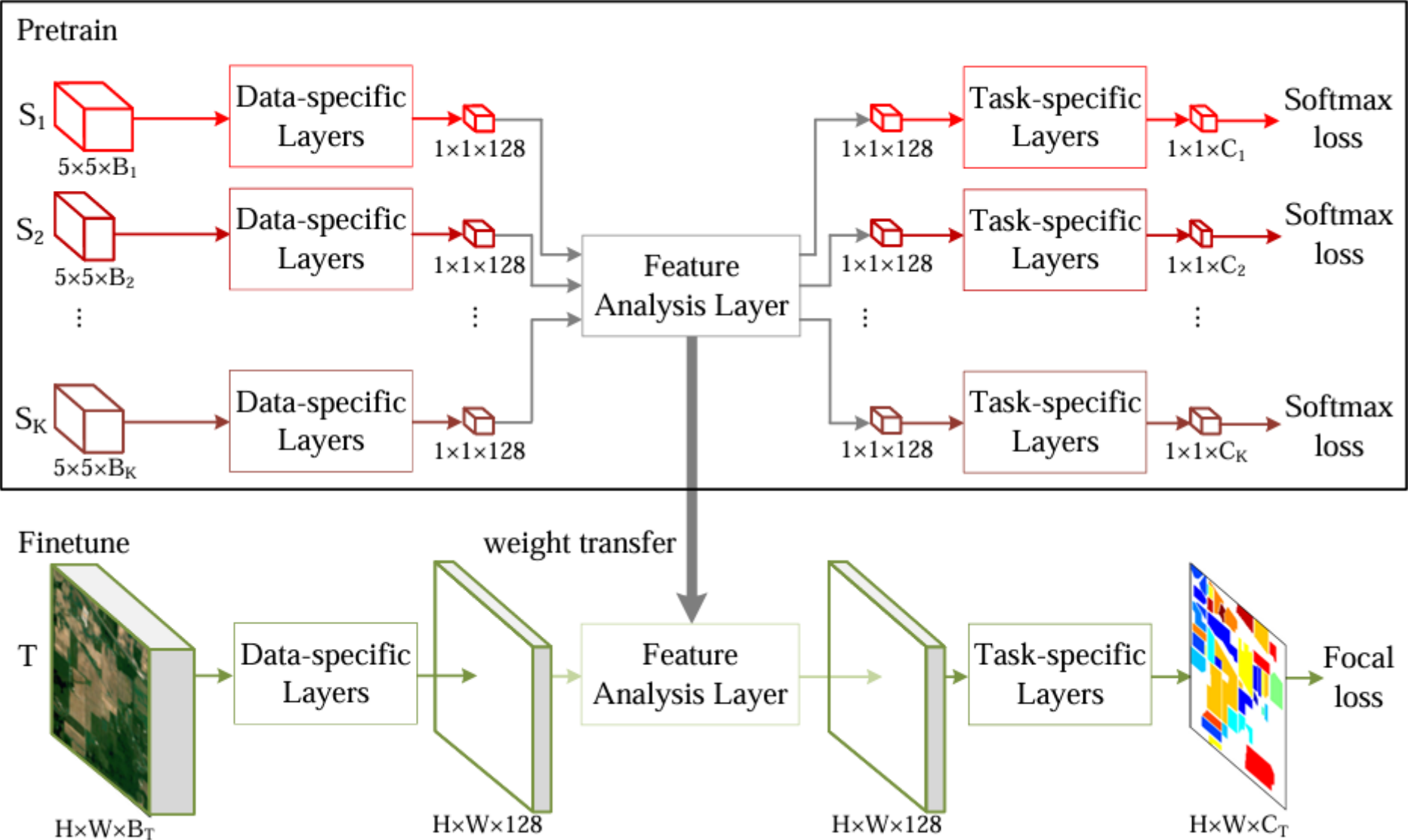


# Pre-trained Deep Learning Networks for Analyzing Hyperspectral Image Data

# Content

- × Introduction
- × Data and Processing
- × PCA
- × Model result
- × References

Exploring Cross-Domain Pretrained Model for Hyperspectral Image Classification

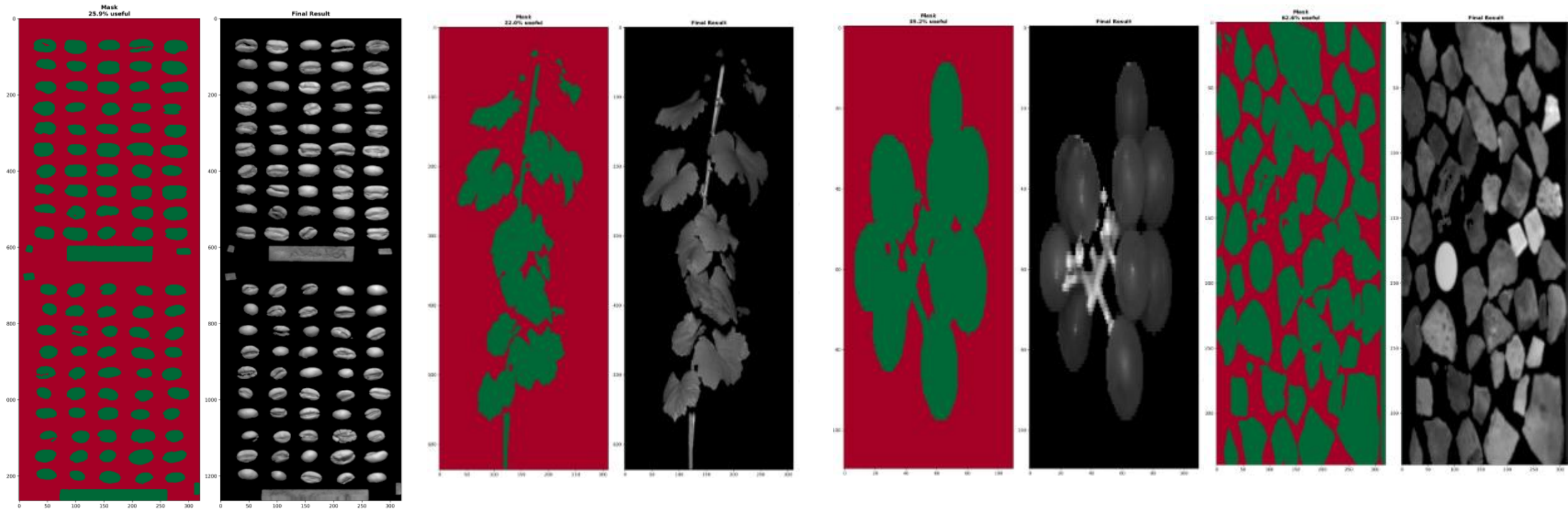


# Data and Processing

Sourced from multiple folders (coffee, grapes, pottery, sugar, paper, archeology, branches), totaling ~29,000 spectrally-rich samples.

Processing Steps:

- \* Cropping and background masking
- \* Patch extraction:  $32 \times 32$  patches, with domain stratification



## PCA for Band reduction

Different hyperspectral cameras and acquisition settings produce different numbers of spectral bands:

Paper domain: 288 bands

Coffee, pottery, sugar domains: 256 bands

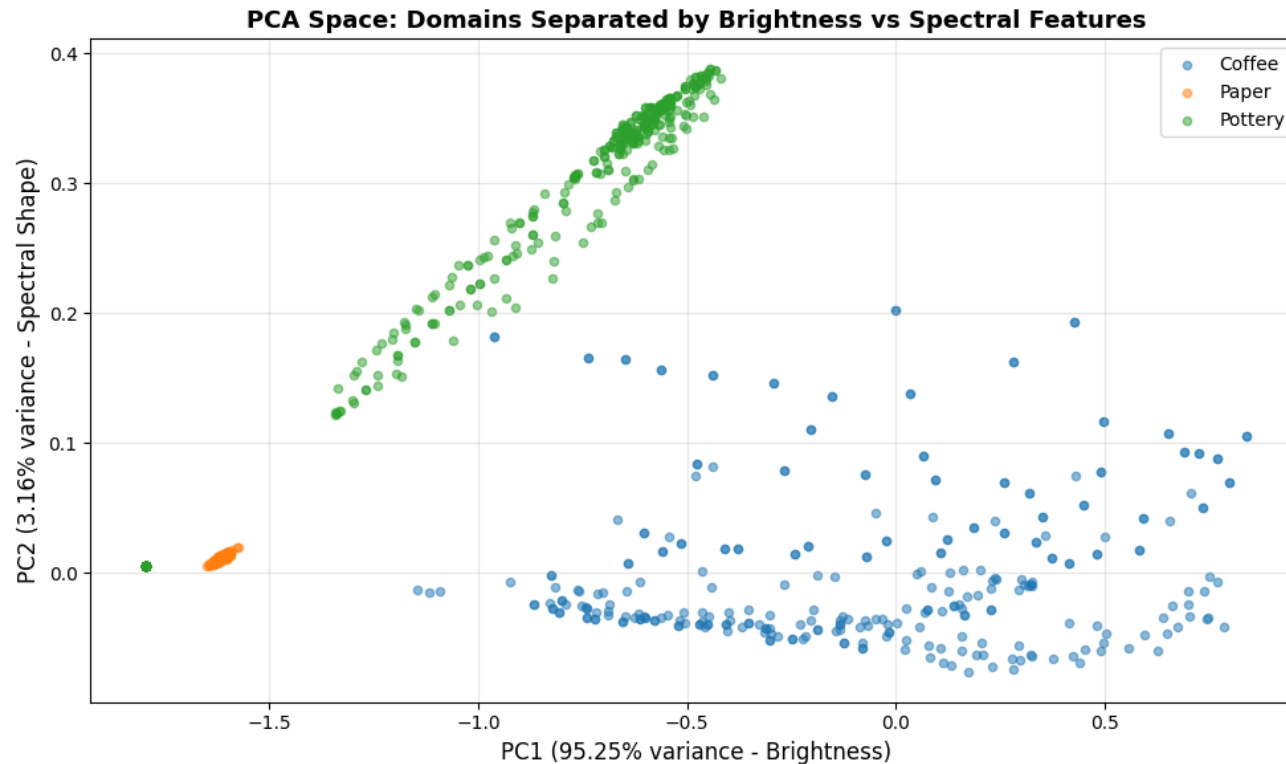
Grapes, branches: 160 bands

Interpolate to have consistent 256 bands across all the domains

# Flatten all patches:  $(39,482 \text{ patches}) \times (256 \text{ pixels}) \times (256 \text{ bands})$

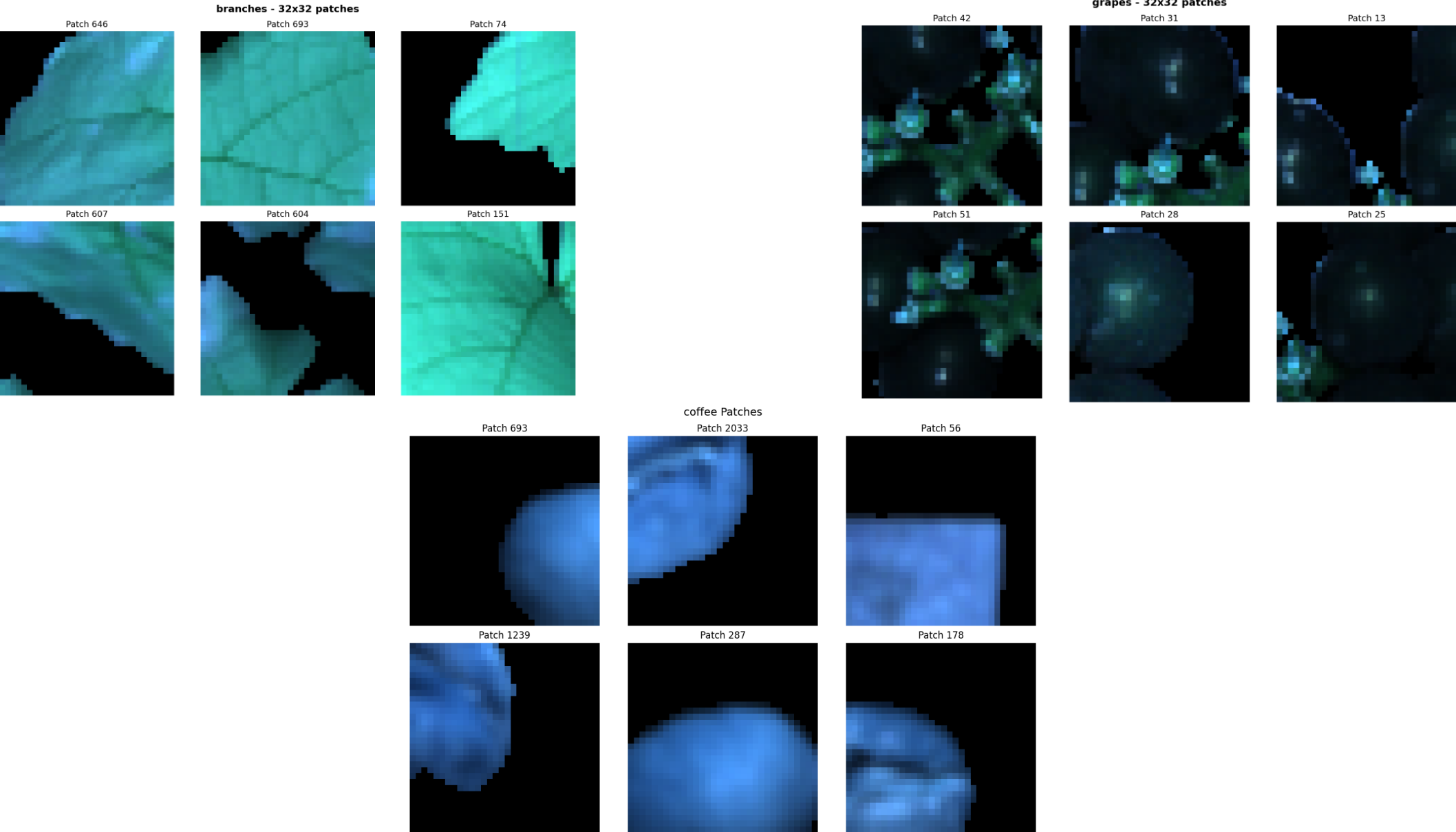
# Fit PCA: Extract top 30 principal components

Visualize PC1 vs PC2

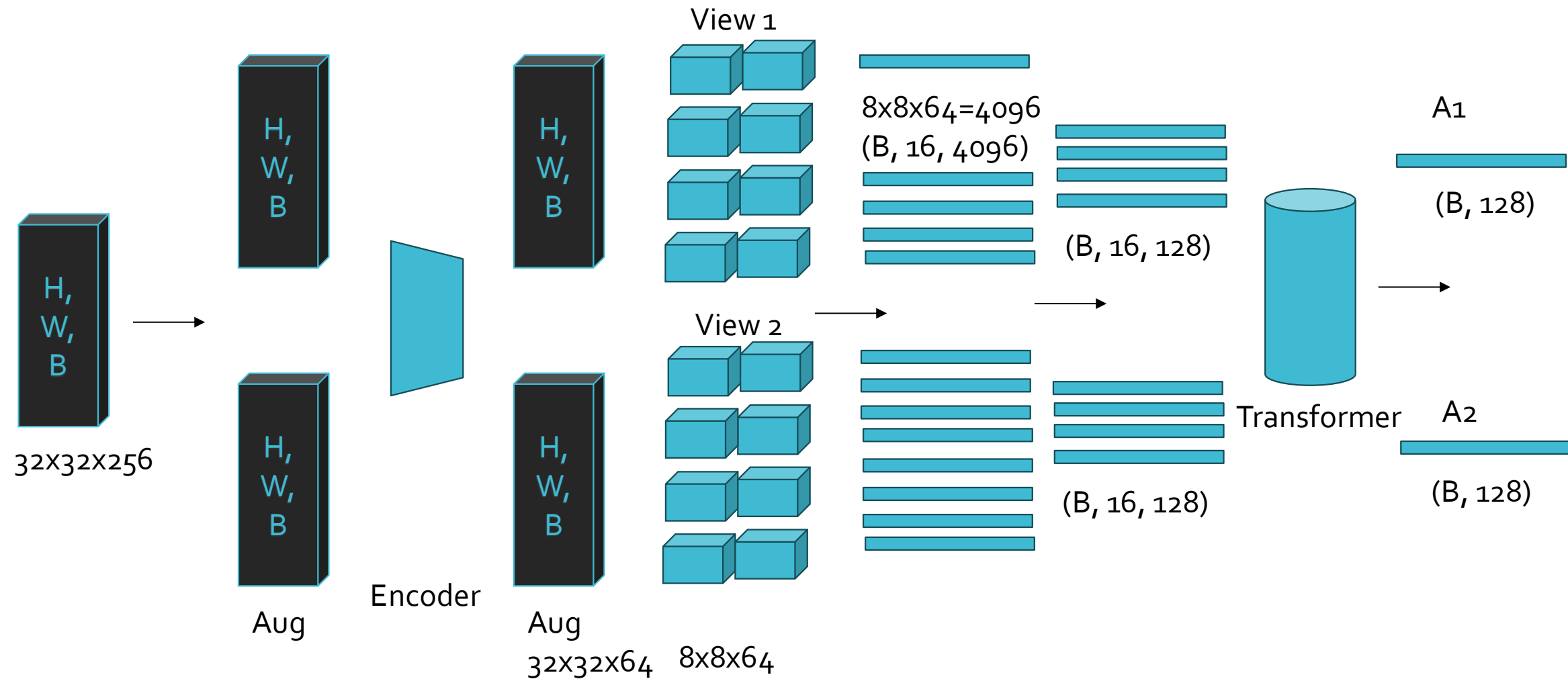


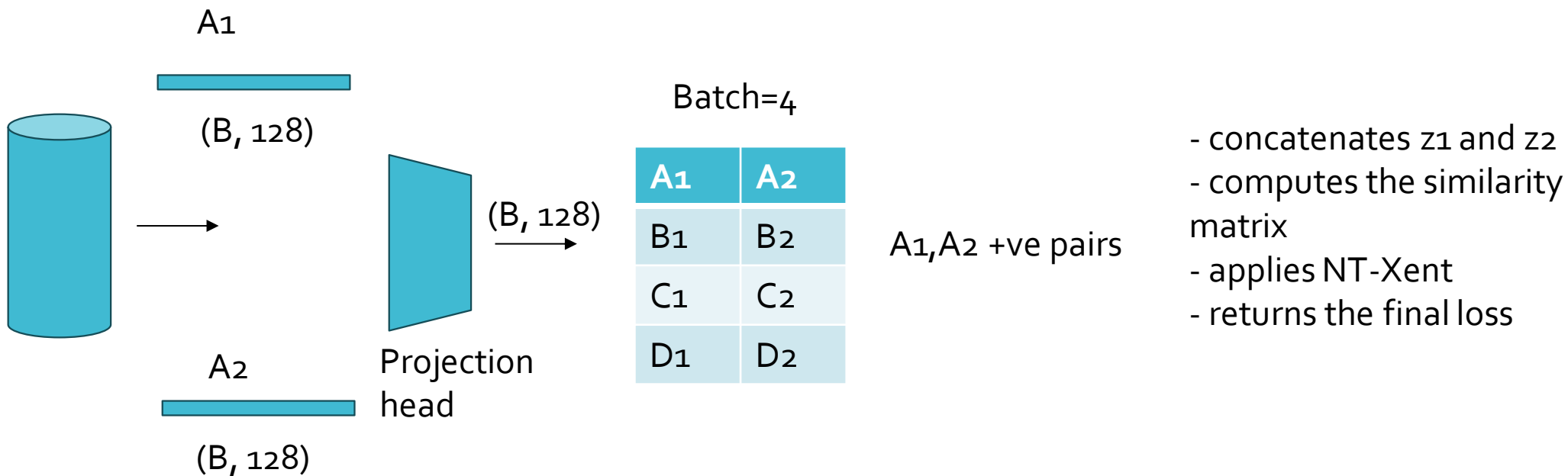
# Make it into Patches for better processing

Making Patches of 32x32 from the image mask



# Architecture of the model





## Training infra

### Hardware Setup

Training is performed on the university cluster with 8× Tesla V100 GPUs (32GB each)

### Multi-GPU Training:

Using DataParallel, we distribute the batch across all 8 GPUs. Each GPU processes 8 samples independently, then gradients are synchronized.

### Training Speed:

Single GPU: ~8 - 9 hours for 100 epochs

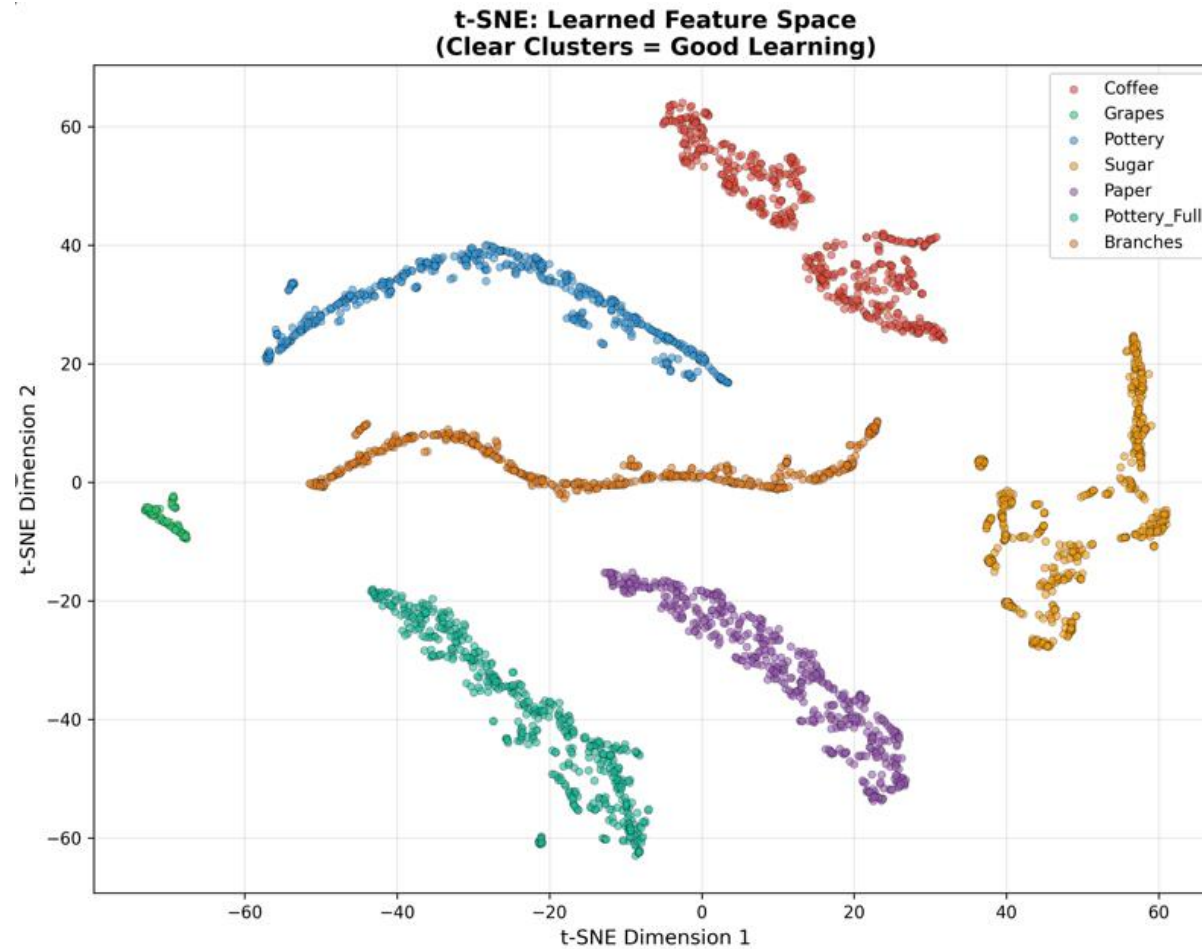
8 GPUs: ~90 -120 min for 100 epochs

### Batch Size & Memory:

Total batch: 64 samples

Per GPU: 8 samples

## Model result 30 epochs



Knn

k-NN Accuracy (k=20): 85.77%

Linear probe

Pretrained backbone accuracy : 47.31%

Random backbone accuracy : 15.44%

Representation gain : +31.87%

[illegible]

Thank you