AIH

Data-Challenge:
Help a hematologist out!

HelmholtzZentrum münchen
German Research Center for Environmental Health

Collaboration

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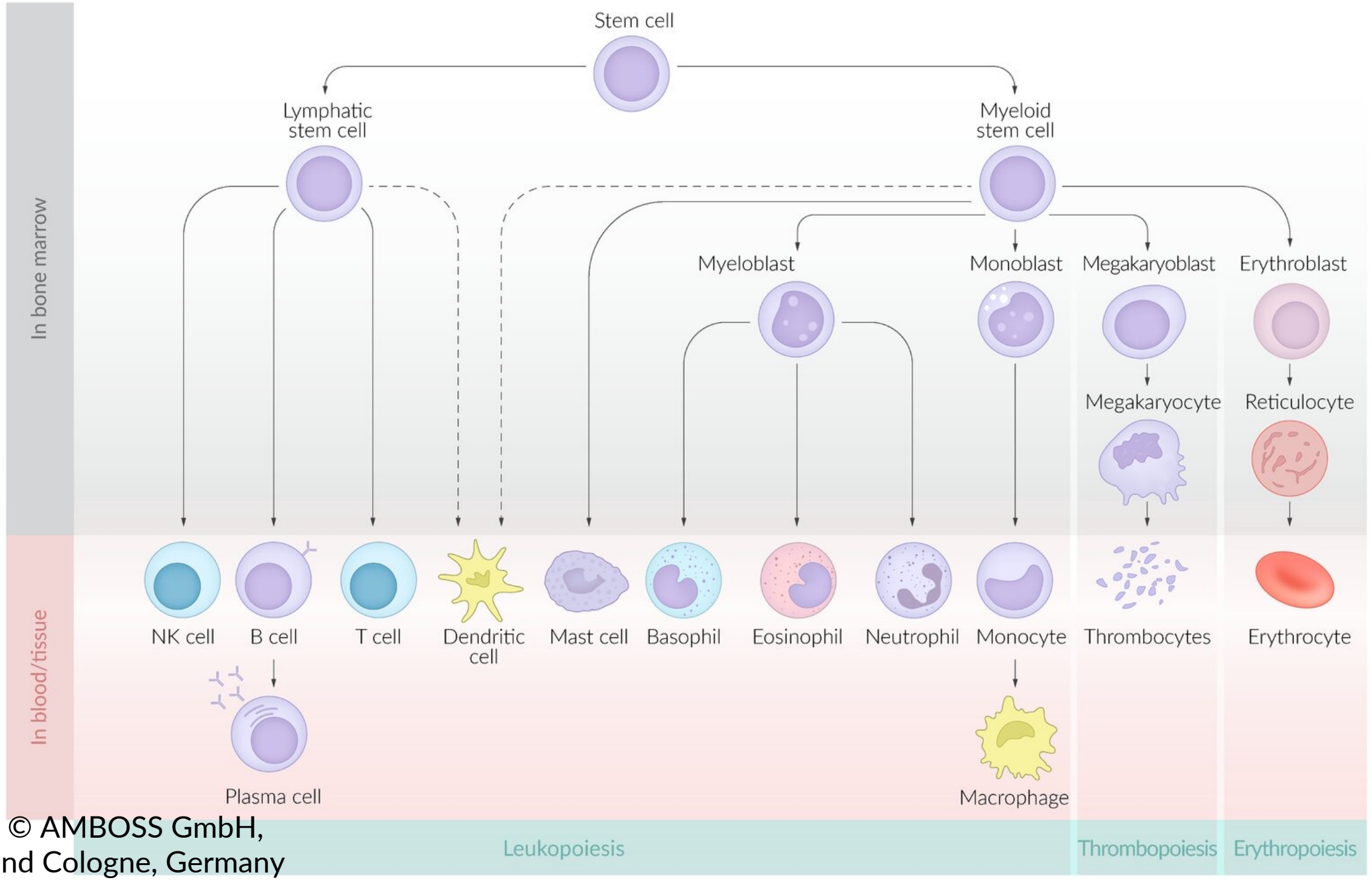
Outline

1. White Blood Cell Lineage
2. Matek_19 Dataset
3. Acevedo_20 Dataset
4. WBC Dataset
5. Domain Generalization and Adaptation



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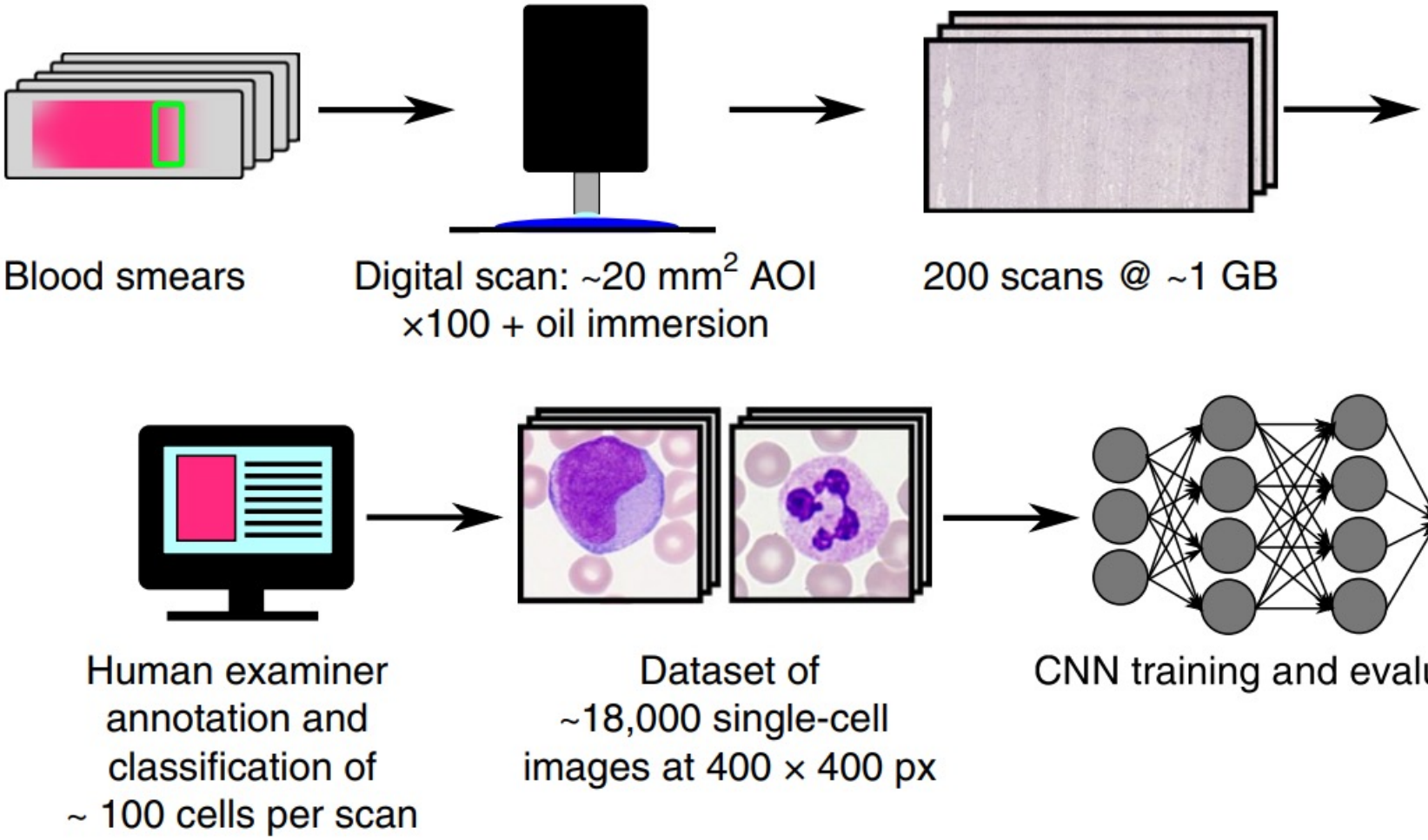
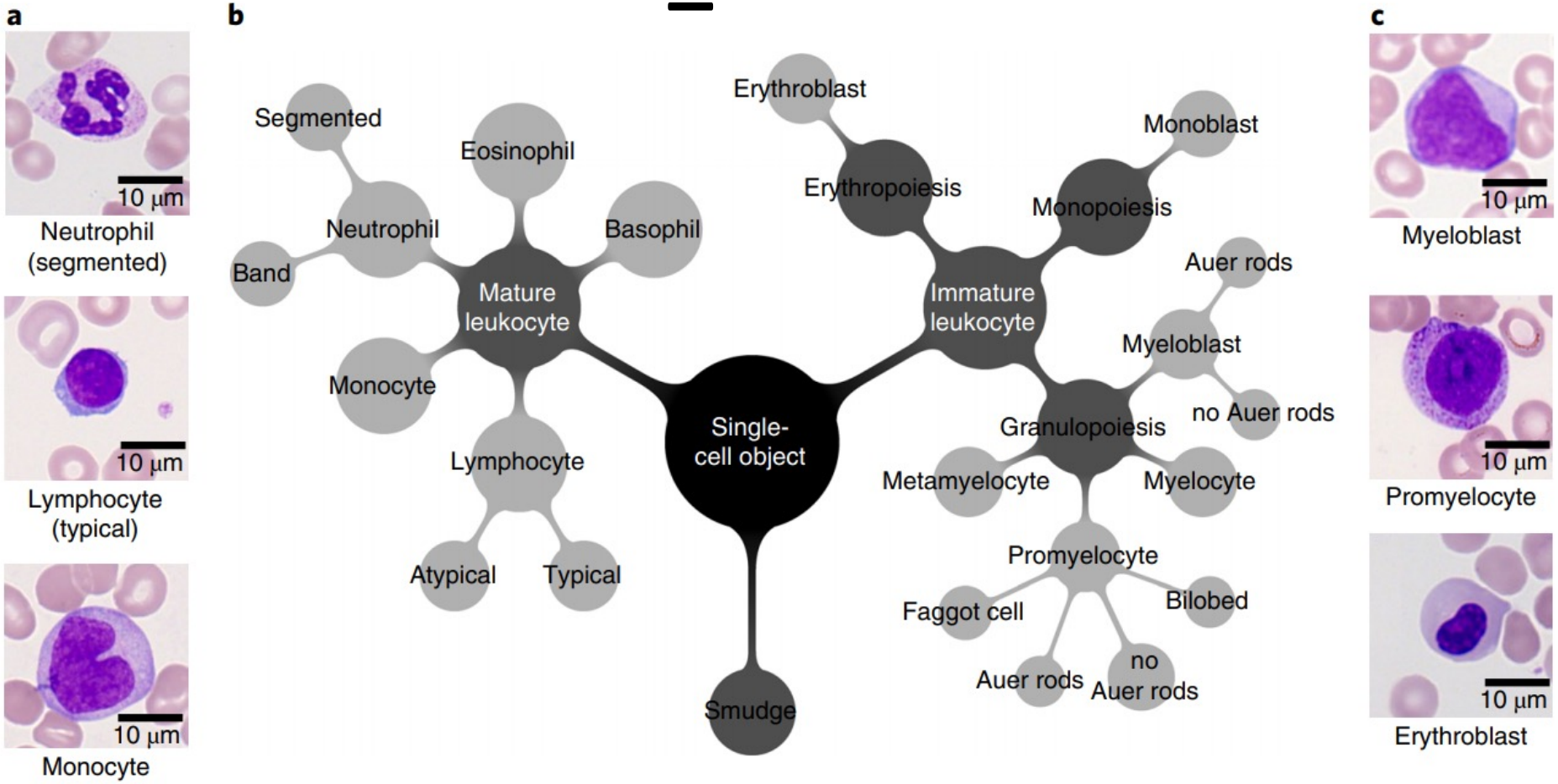
Matek_19 Dataset



C. Matek et al.: Human-level recognition of blast cells in acute myeloid leukaemia with convolutional neural networks. Nature Machine Intelligence, 2019.

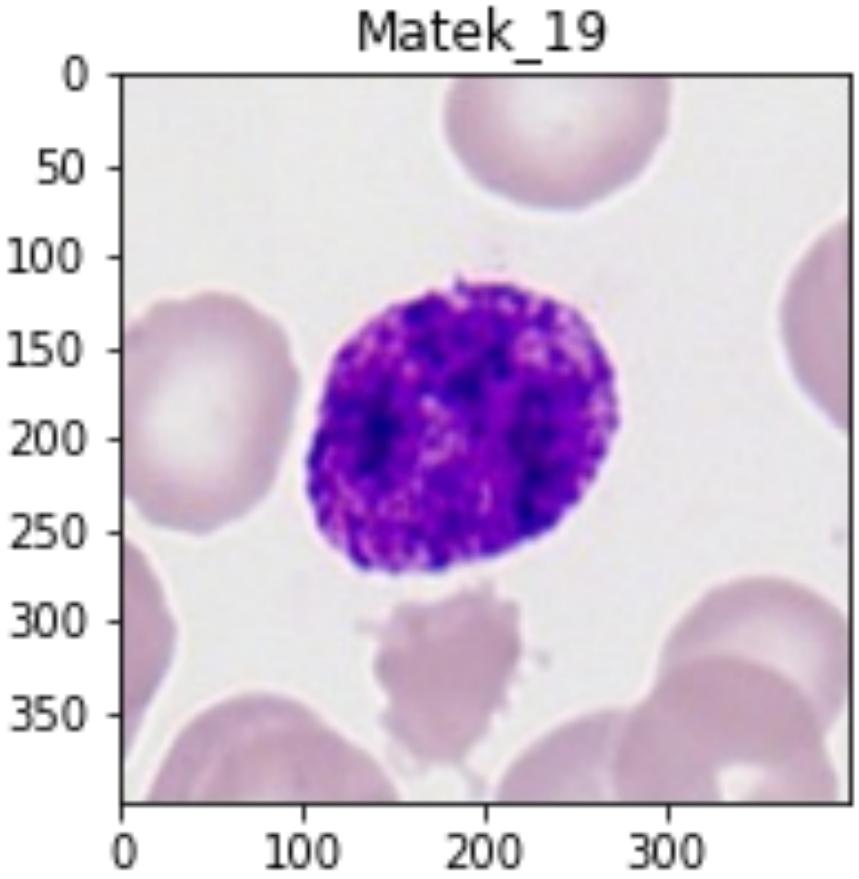
Matek_19 Dataset

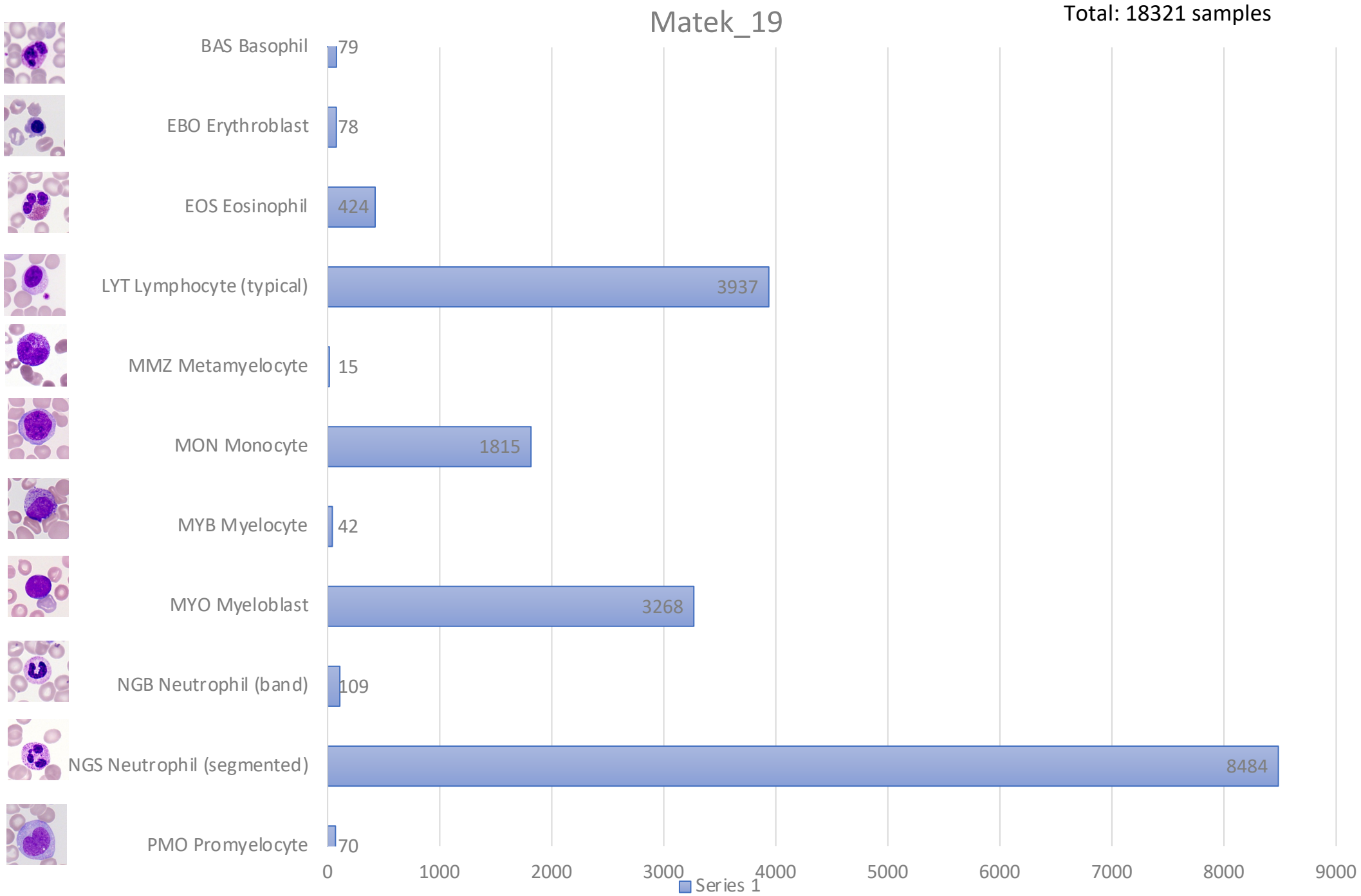


C. Matek et al.: Human-level recognition of blast cells in acute myeloid leukaemia with convolutional neural networks. Nature Machine Intelligence, 2019.

Matek_19 Dataset

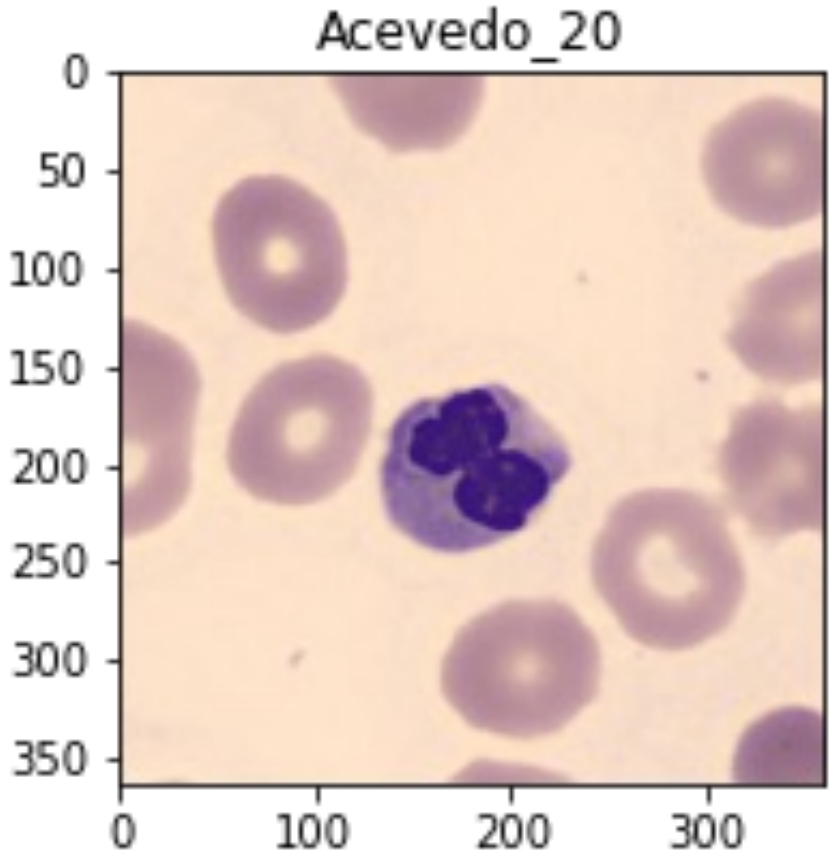
- 11 Classes
- 18321 samples
- (400 x 400) pixels
- 29.0 micrometers x 29.0 micrometers
- = 13.8 pixels/micron




Matek_19
Total: 18321 samples
BAS Basophil
79
EBO Erythroblast
78
EOS Eosinophil
424
LYT Lymphocyte (typical)
3937
MMZ Metamyelocyte
15
MON Monocyte
1815
MYB Myelocyte
42
MYO Myeloblast
3268
NGB Neutrophil (band)
109
NGS Neutrophil (segmented)
8484
PMO Promyelocyte
70
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
Series 1

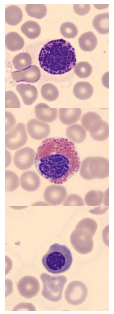
Acevedo_20 Dataset

- 10 Classes
- 14291 Samples
- (360 x 363) pixels
- 36.0 micrometers x 36.3 micrometers
- = 10 pixels/micron



Acevedo_20

Total: 14291 samples

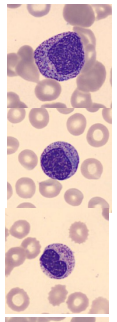


Basophil 1168

Eosinophil 3067

Erythroblast 1.499

Myeloblast 0



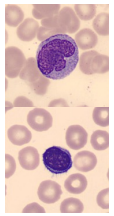
Promyelocyte 592

Myelocyte 1.137

Metamyelocyte 1.015

Banded Neutrophil 1.633

Segmented Neutrophil 1.646

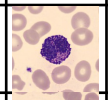
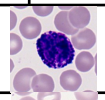
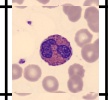
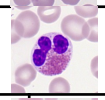
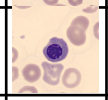
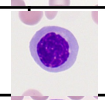
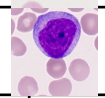
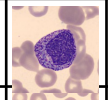
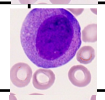
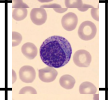
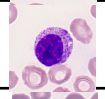
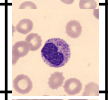
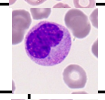
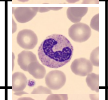
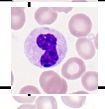
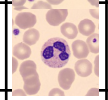
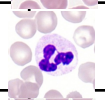
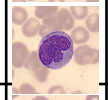
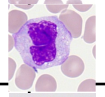
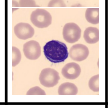
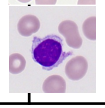


Monocyte 1370

Lymphocyte 1164

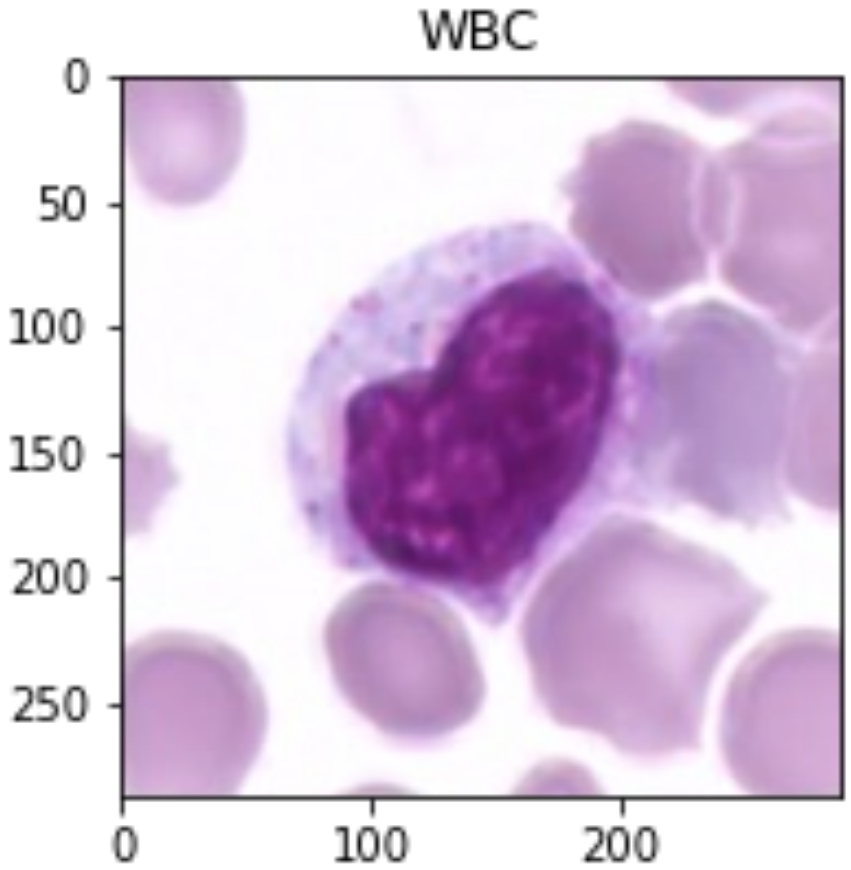
0 500 1000 1500 2000 2500 3000 3500

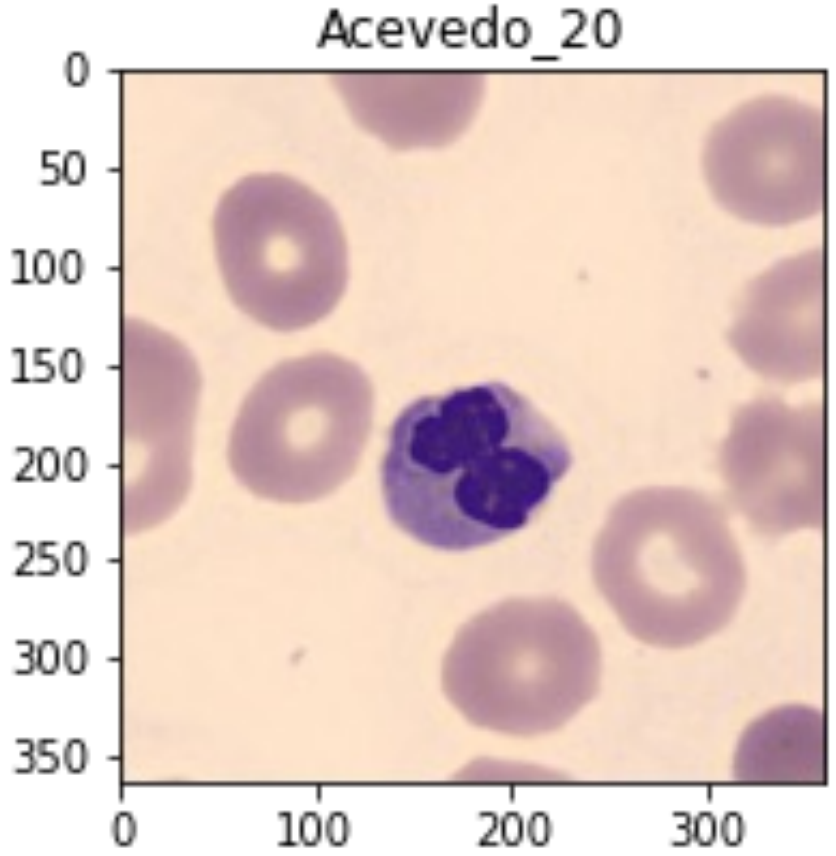
Samples

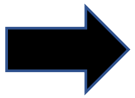
Common Class	Acevedo_20		Matek_19		Total
	Percentage	Sample	Percentage	Sample	
Basophil	1168		79		1247
Eosinophil	3067		424		3491
Erythroblast	1499		78		1577
Myeloblast	/	/	3268		3268
Promyelocyte	592		70		662
Myelocyte	1137		42		1179
Metamyelocyte	1015		15		1030
Banded Neutrophil	1633		109		1742
Segmented Neutrophil	1646		8484		10130
Monocyte	1370		1815		3185
Typical Lymphocyte	1164		3937		5101
Total	14291		18321		32612

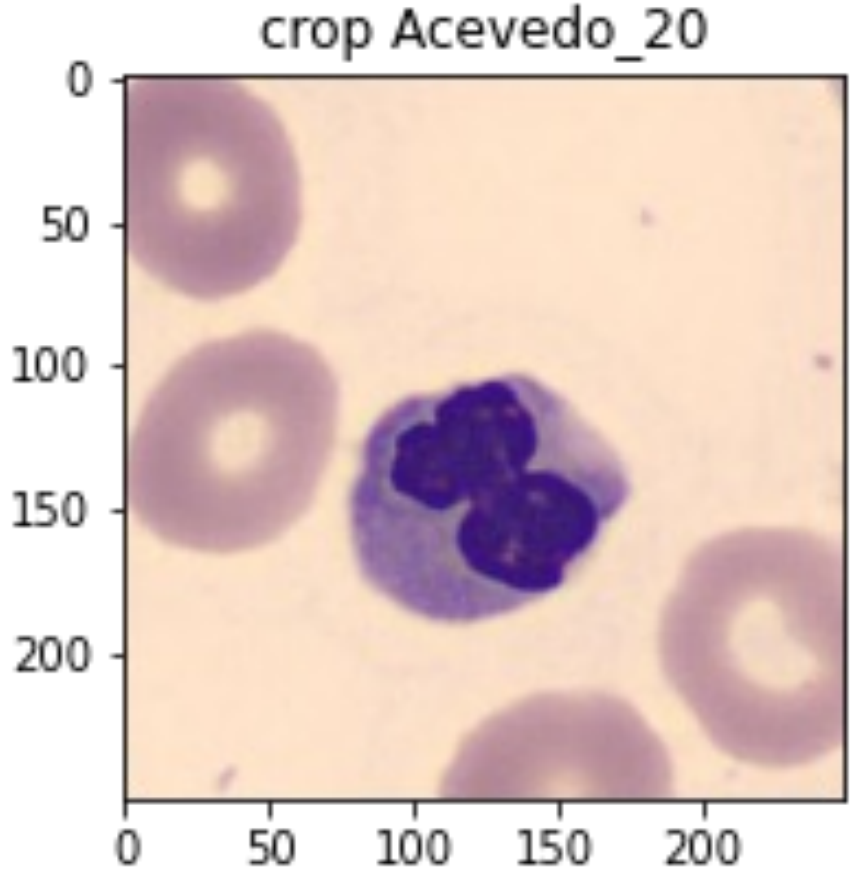
WBC_1 Dataset

- 11 classes
- (288 x 288) pixels
- 25.0 micrometers x 25.0 micrometers
- = 11.52 pixels/micron



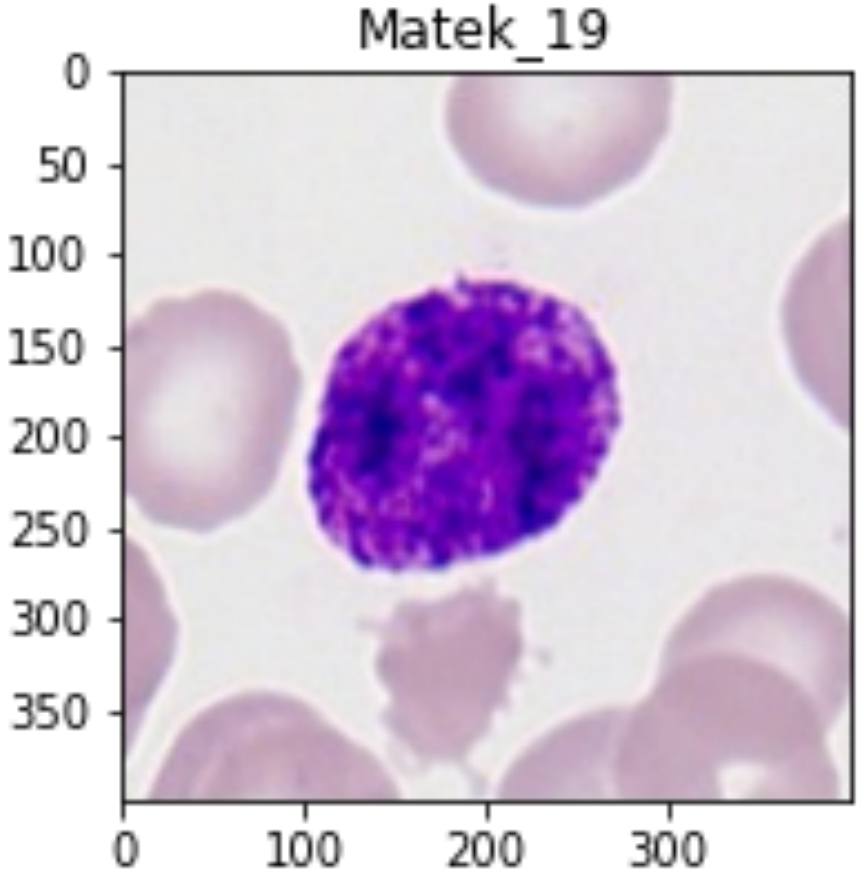


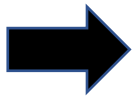


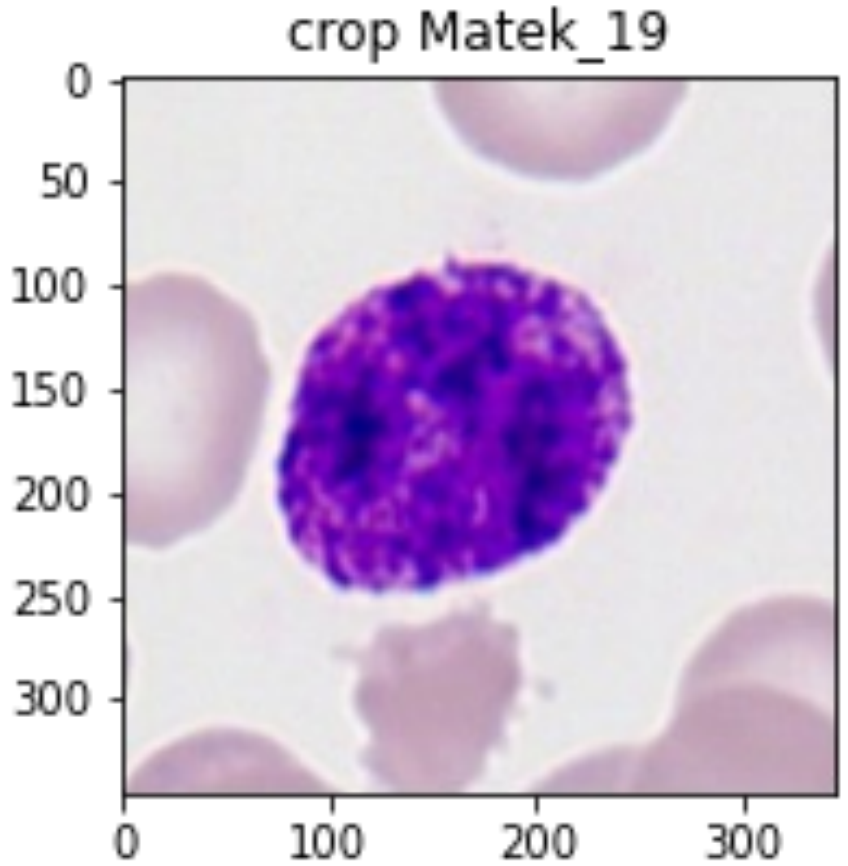


- (360 x 363) pixels
- 36.0 micrometers x 36.3 micrometers
- = 10 pixels/micron

- (250 x 250) pixels
- 25.0 micrometers x 25.0 micrometers
- = 10 pixels/micron

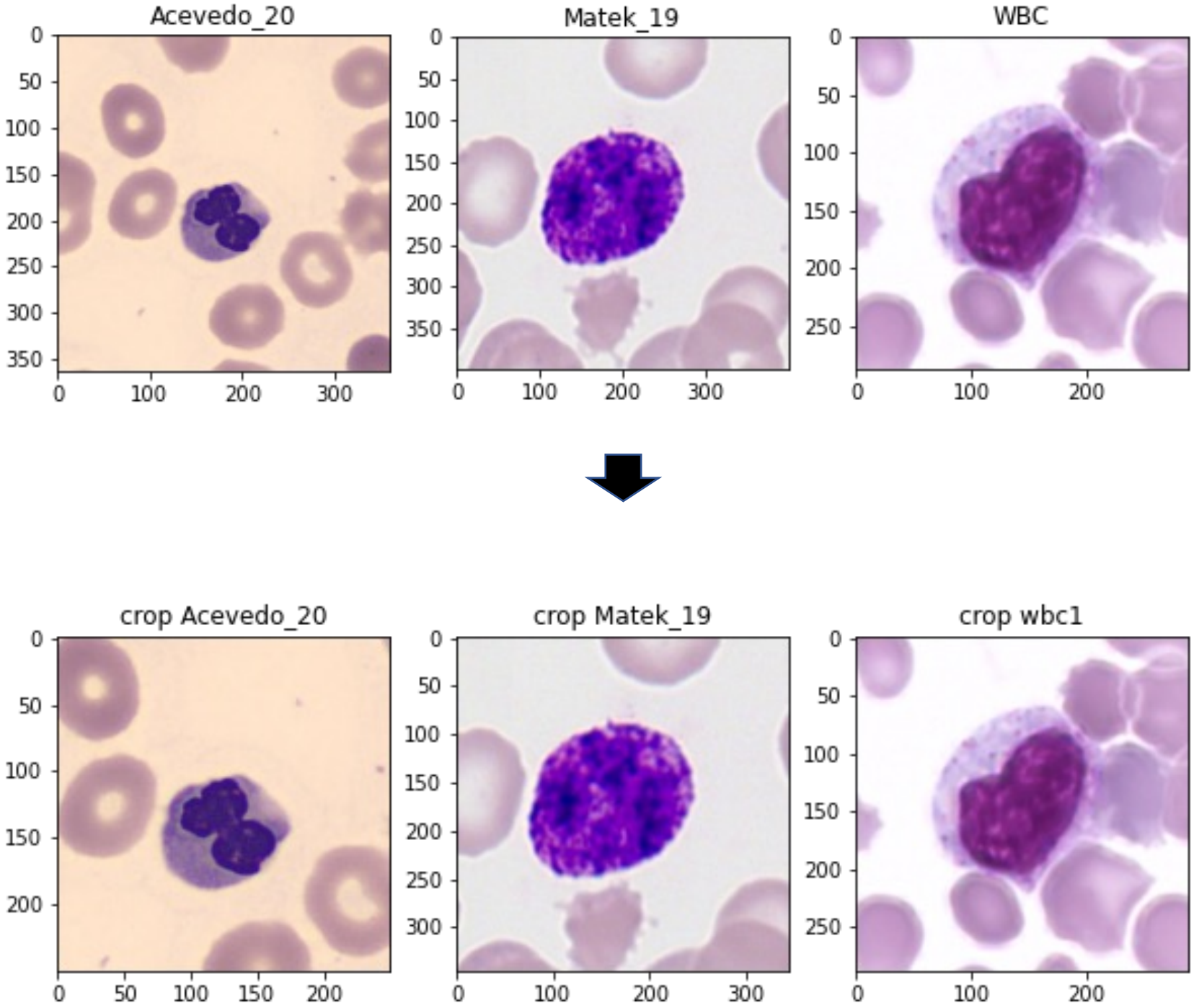




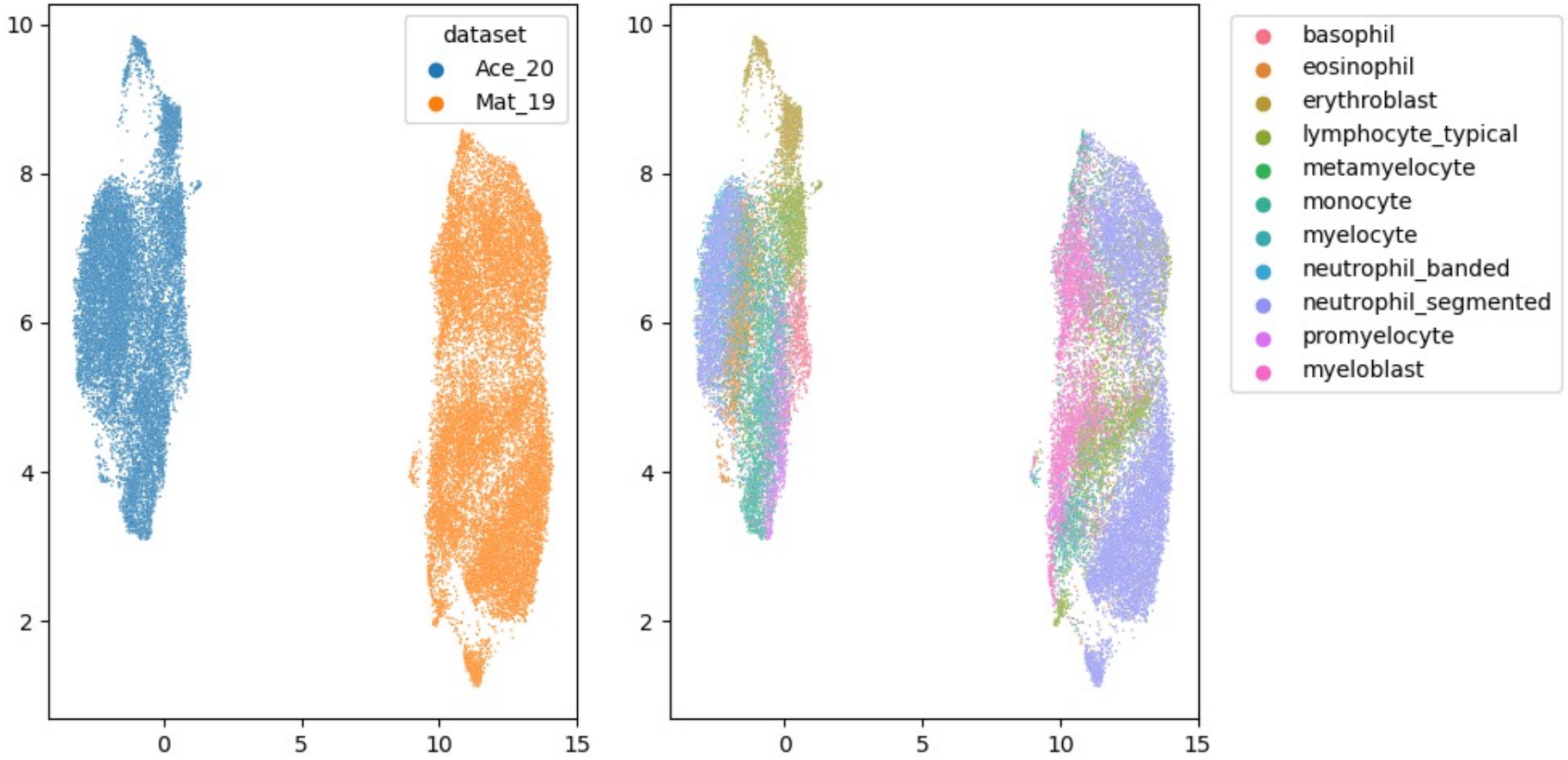


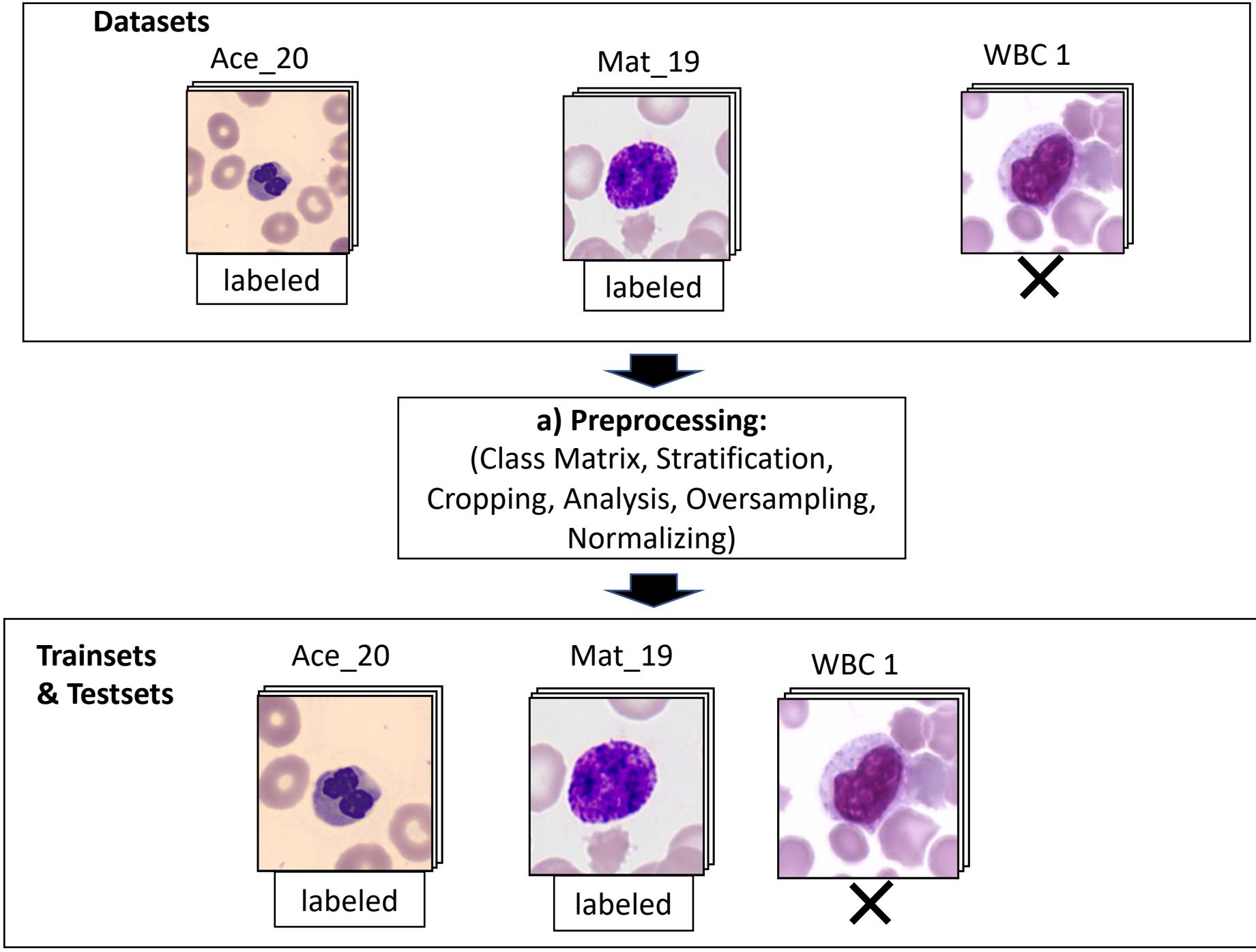
- (400 x 400) pixels
- 29.0 micrometers x 29.0 micrometers
- = 13.8 pixels/micron

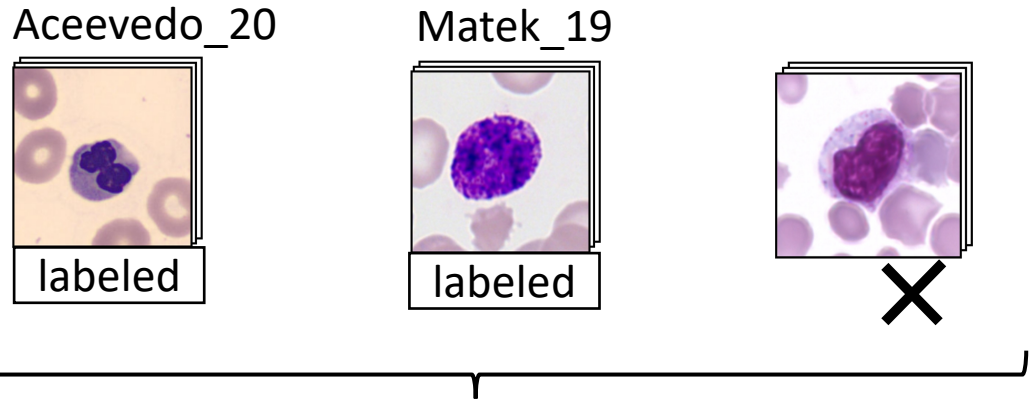
- (345 x 345) pixels
- 29.0 micrometers x 29.0 micrometers
- = 13.8 pixels/micron


Acevedo_20
Matek_19
WBC
crop Acevedo_20
crop Matek_19
crop wbc1

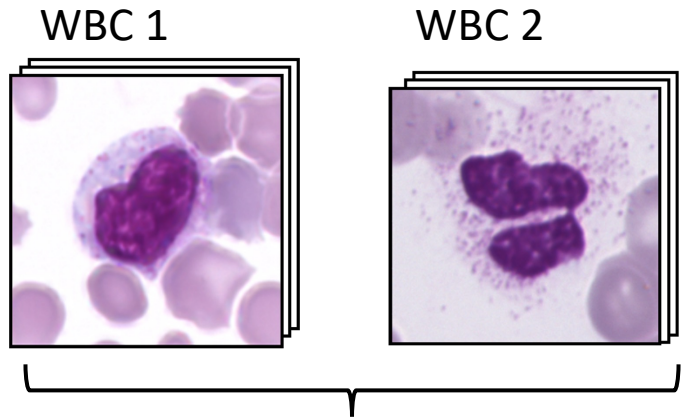
UMAP

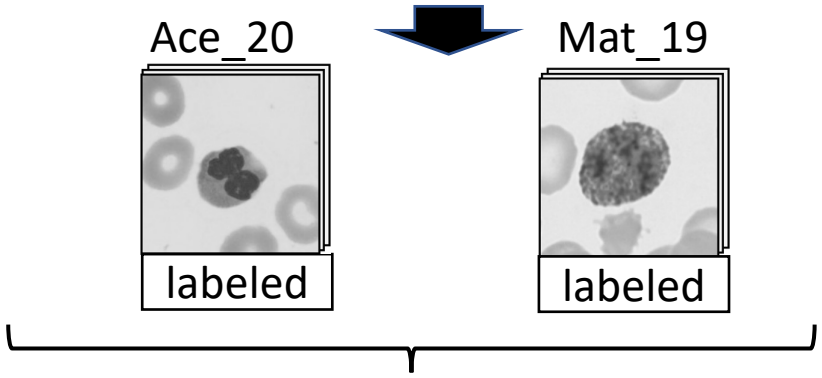

dataset
Ace_20
Mat_19
basophil
eosinophil
erythroblast
lymphocyte_typical
metamyelocyte
monocyte
myelocyte
neutrophil_banded
neutrophil_segmented
promyelocyte
myeloblast
10
8
6
4
2
0
5
10
15


Datasets
Ace_20
labeled
Mat_19
labeled
WBC 1
a) Preprocessing:
(Class Matrix, Stratification,
Cropping, Analysis, Oversampling,
Normalizing)
Trainsets
& Testsets
Ace_20
labeled
Mat_19
labeled
WBC 1



Preprocessing
(Cropping, Augmentations, …)





Neural Net Training

Evaluation:
macro f1_score

Comparison of Methods:
(Trained Network, f1_score, Accuracy)