



MELANOMA DETECTION

Deep Learning a gyakorlatban Python és LUA alapon
BME / VITMAV45

QuickMath
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MOTIVATION

Detect & Treat

01

HISTORY

Technology & Dermatology

02

DATABASE

HAM10000

03

ARCHITECTURE

How to implement transfer learning?

04

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"I truly believe there's always a solution to every problem."
M. Kalman

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01

MOTIVATION

Detect & Treat



WHAT IS MELANOMA?



MELANOMA

Skin cancer,
Originated from melanocyte
cells,
Increasing occurrence



CURE

Tumor stage V: 9-15%
Aggressive, metastasis



EARLY DETECTION

Treatment in early stage: 90%



DERMOSCOPY

Noninvasive,
in vivo technique



BIOPSY

Expensive and
in case of benign moles an
unnecessary surgery



TECHNOLOGY

Improve better techniques to
help early detection of
melanoma

MELANOMA AND AI

PATTERN RECOGNITION

Specific morphological features
Computer vision
CNN



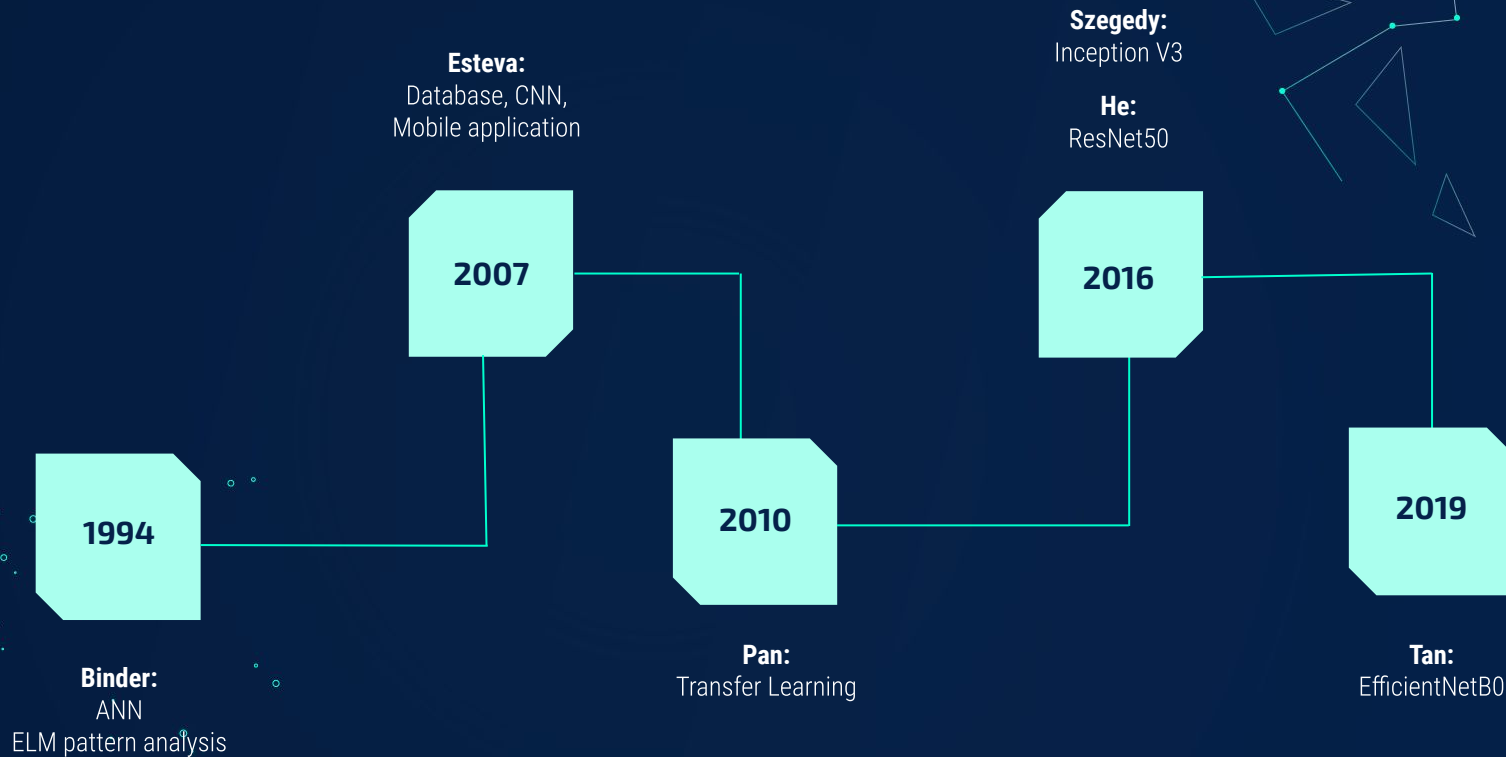


02

HISTORY

Technology & Dermatology

REVIEW OF PAST EVENTS






03

DATABASE

HAM10000

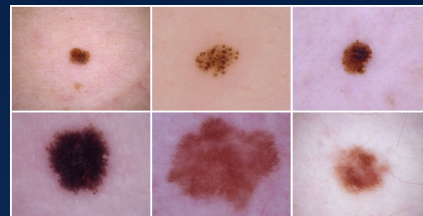
MELANOMA DATABASES

- **HAM10000 (Tschandle et al. 2018)**
- Esteva et al. (129 450 img)
- Asan Dataset
- Atlas site images (19 398 img)
- Hallym Dataset
- ISIC Dataset
- PH² Database
- DERMOFIT Project Datasets / University of Edinburgh (1300img)
- MELANIX Dataset / DICOM Image Library
- MED-NODE Dataset (170 img)
- IMA205 Dataset (900 img)

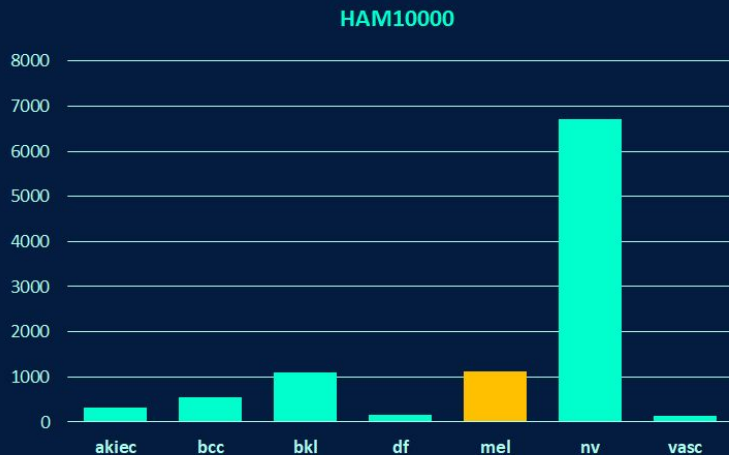
HAM10000

- Tschandle et al. 2018
- 10 015 images, 1113 melanoma
- 600x450px, 96DPI

Benign moles



Melanoma



04

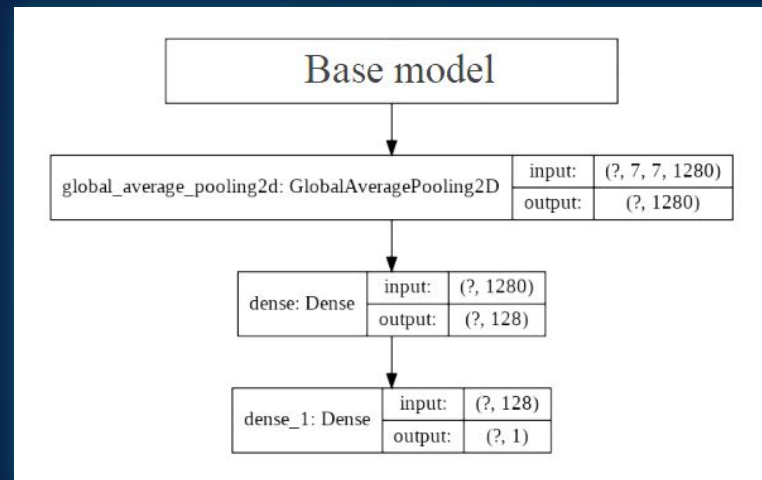
ARCHITECTURE

How to implement transfer learning?



MODEL ARCHITECTURE

- Binary classification
- CNN
- Transfer learning
- Base: InceptionV3 & EfficientNetB0



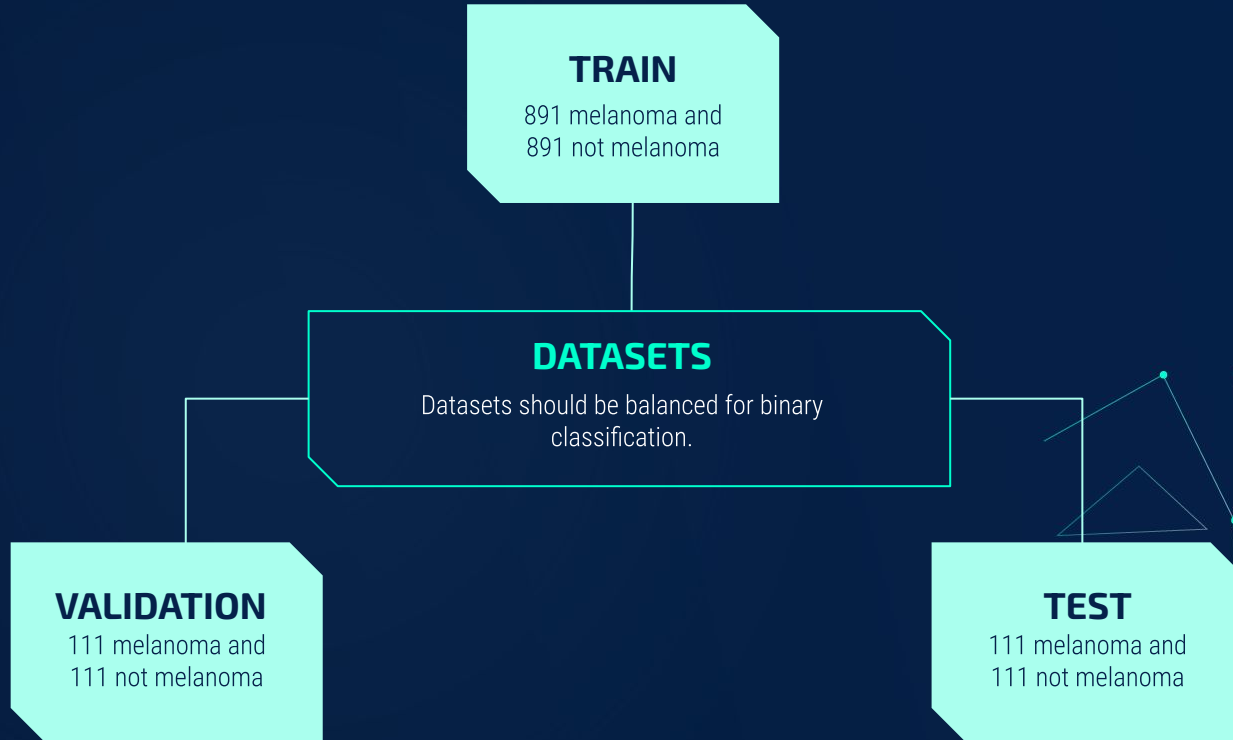


05

TRAINING

Train & Test & Validation

SPLITTING DATASETS



HYPERPARAMETERS

	Number of epochs	Batch size	Learning rate	Optimizer	Image size	Step per epoch
InceptionV3	50	16	0.00001	Adam	299x299	100
EfficientNetB0	50	16	0.0001	Adam	224x224	100



06

PROBLEMS & SOLUTIONS

"I truly believe there's always a solution to every problem." M. Kalman



PROBLEMS & SOLUTIONS

- | | | |
|------------------------|---|----------------------------------|
| ● Unbalanced dataset | → | Data augmentation |
| ● Melanoma morphology | → | Horizontal and vertical flip |
| ● Colab RAM is limited | → | <code>flow_from_directory</code> |
| ● Colab timeout | → | JavaScript |
- 



07

RESULTS

Model performance

RESULTS

87.84 %

EfficientNetB0 accuracy

0.3233 %

EfficientNetB0 loss

82.43 %

InceptionV3 accuracy

0.4101 %

InceptionV3 loss



08

FUTURE PLANS

Ideas & Opportunities



FUTURE PLANS



RESNET

as base model to get an overall picture of transfer learning techniques, and to choose the best model

Automatic hyperparameter optimizations to improve model accuracy

HYPERAS



MOBILE APP

Giving access for everyone to check if they have melanoma or not



THANKS

Does anyone have any questions?