Burn Wound Imaging Classification
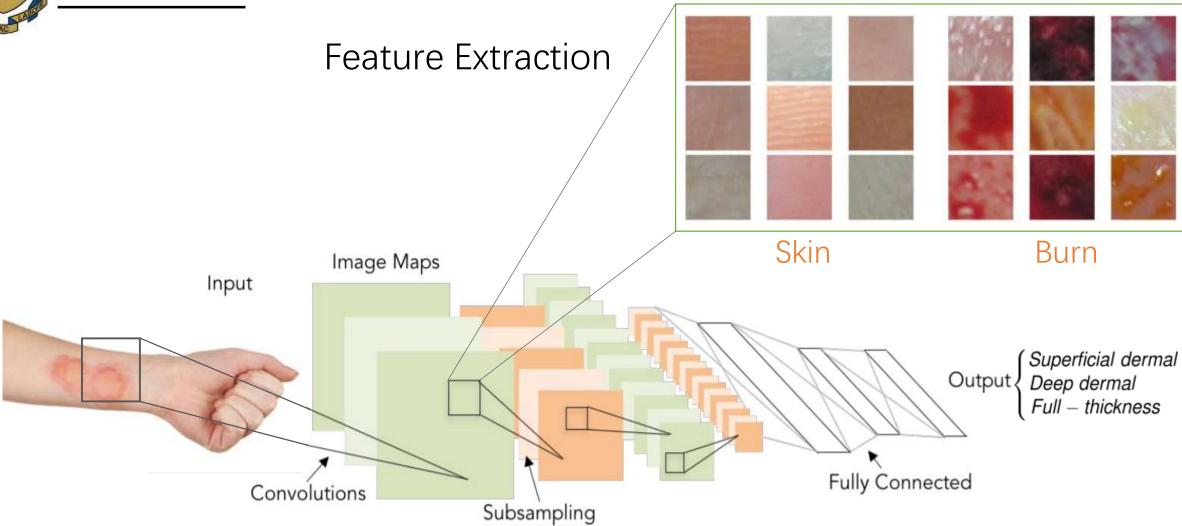
Data7901 Frontier Project Seminar
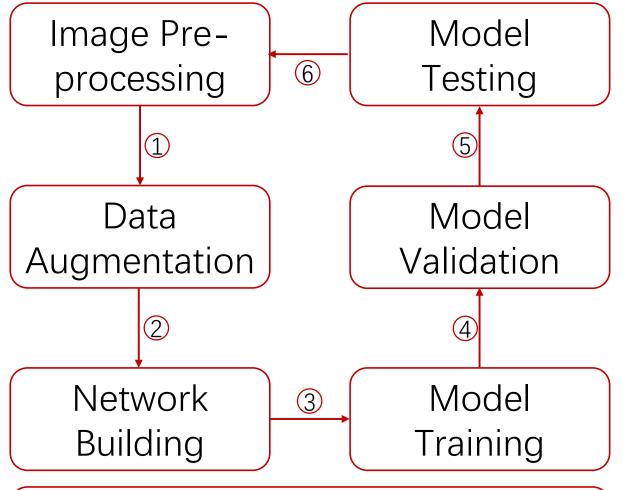
Week 13, S1, 2021

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Project Definition: developing a system for burn wound recognition that helps to classify the categories of burn wounds
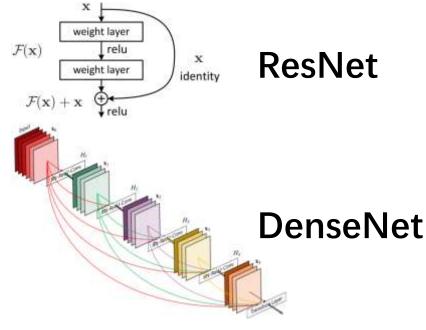
Workflow

Feature Extraction

Skin   Burn

Input

Image Maps

Convolutions

Subsampling

Fully Connected

Output { *Superficial dermal* / *Deep dermal* / *Full − thickness* }

Approach

Image Pre-processing →① **Data Augmentation** →② **Network Building** →③ **Model Training** →④ **Model Validation** →⑤ **Model Testing** →⑥ **Image Pre-processing**

Transfer Learning and **Domain Adaptation** may also involved during the **Network Building**.

Network

ResNet

DenseNet

Programming

python   PyTorch

Datasets

Herston Biofabrication Institute (HBI) is the key partner of one health services provider which is called the Metro North Health. HBI receives 3000-3500 referrals per year.

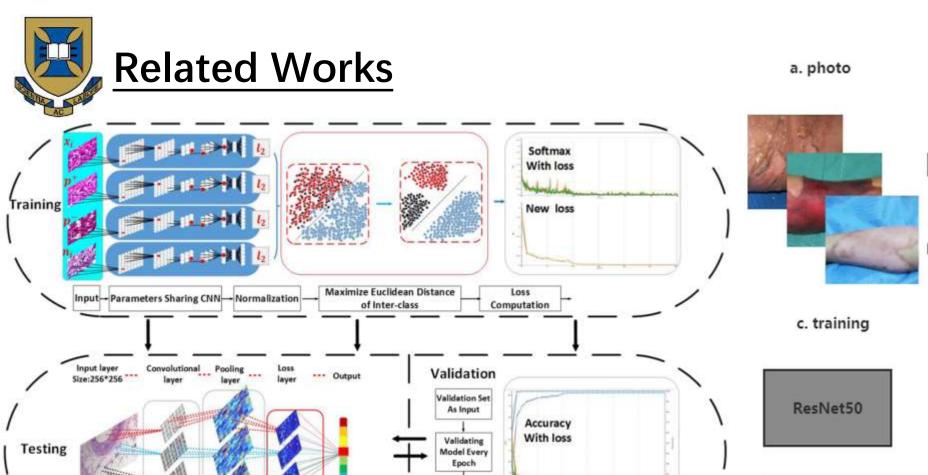We have achieved the samples of **84** burn wound images.

The dataset contains **3** different burn types, Superficial dermal, Deep dermal, and Full-thickness. **20** images in training set and **74** images in testing set.

Acknowledgement: This database belongs to the Biomedical Image Processing (BIP) Group from the Signal Theory and Communications Department (University of Seville, SPAIN) and Virgen del Rocío Hospital (Seville, SPAIN) .

Public Datasets

Must be careful when utilizing the burn wound images and not allowed to share with others.

(for example, some images may appear tattoos, which is very sensitive when corresponding to identify a person.)

Privacy Issues

Related Works

a. photo

b. dataset

Train Set

Val Set

Test Set

c. training

d. output

ResNet50

Train set & Val set

Test set

Model → Result

Input → Parameters Sharing CNN → Normalization → Maximize Euclidean Distance of Inter-class → Loss Computation

Training

Softmax With loss

New loss

Testing

Input layer Size:256*256 ··· Convolutional layer ··· Pooling layer ··· Loss layer ··· Output

Input Size = 1 → Low-level Feature → Middle-level Feature → High-level Feature → Trainable Classifier

Validation

Validation Set As Input

Validating Model Every Epoch

Fine-tuned Model Parameters

Accuracy With loss

[Han et al., 2017]

Breast cancer multi-classification based on GoogLeNet

nature
International journal of science

[Wang et al., 2020]
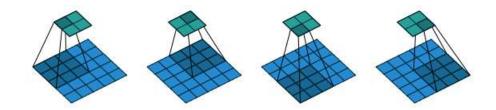
Burn depth multi-classification using ResNet50

BURNS

Motivation and Conclusion

Feasibly,

- The burn wounds' depth and type can be accessed through <u>color, moisture and whether there exists blisters,</u> which is just the advantages of Computer Vision Technologies. (for example, the deeper the burn is, the more paler it would be.)

Potentially,

- By achieving our objective, we can Improve the efficiency and accuracy of <u>early clinical diagnosis.</u>

Finally,

- The success of the project would make huge contributions for the domain of <u>Medical Image Analysis.</u> It will encourage our researchers to keep working on and saving more lives.

Reference

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