Biomedical Image Classification Algorithms Evaluation

Stella Vetova

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Real-Time Polymerase Chain Reaction (RT-PCR)

Medical Imaging
Real-Time Polymerase Chain Reaction (RT-PCR)

Disadvantages:

1. the option of error occurrence
2. the time consuming to identify the disease
Medical Imaging provides clear evidence for disease occurrence and enables its treatment.
Methods for Image Classification

Image Features Extraction and Similarity Analysis

Image Features Extraction and Artificial Neural Network
Image Features Extraction and Similarity Analysis

Tasks

1. Image features extraction and generating feature vectors on the base of primitive

2. Similarity computation on the base of similarity measure (Euclidean distance, Manhattan distance, Mahalanobis distance, Canberra distance, etc.)
Image Features Extraction and Artificial Neural Network

Tasks

1. Image features extraction and generating feature vectors on the base of primitive
2. Performing training using the generated feature vectors.
3. Query-Image processing on the base of tasks 1 and 2.
Artificial Neural Network:

- model of natural neural networks;
- perform the functions of the human brain;

Structure of ANN

- a finite number of neurons connected to each other in a certain order and model to perform a specific task;
Image Features Extraction and Artificial Neural Network

Application
data classification on the base of extracted feature vectors in advance performing deep learning to learn the neural network for a new classification task
Techniques for image analysis and classification

- Low-level features
  1. Color
  2. Shape
  3. Texture
  4. Layout

- Group classification
  1. Spatial
  2. Spectral


**Spectral group**
- Effectively measure image energy;
- Rotation and image noise resistant image feature vectors;
- i. g. Gabor filters, wavelet, Discrete Cosine Transform (DCT), curvelet, Discrete Wavelet Transform (DWT), contourlet;

**Spatial group**
- Computing statistical values
- Rotation irresistance
- Insufficiency of number of features
- Sensibility of image noise
The Dual-Tree Complex Wavelet Transform

- Complex Wavelet Transform (CWT)
- Complex valued scaling function
- Complex-valued wavelet

Basic idea – transform producing analytic signal (on the analogy of Fourier transform) with the following properties:
- Smooth non-oscillating magnitude
- Nearly shift-invariant magnitude
- Significantly reduced aliasing effect
- Directional wavelets in higher dimensions
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Algorithm and results

Stage 2

Stage 1

Generating signature

Data Storage

Image Pre-processing

Classification Analysis

Test Image DB Submission

Classification results

Class 0

Class 1

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Experimental results

- Accuracy (%): 90.00%
- Precision (%): 90.00%
- Recall (%): 60.00%
Thank You!

Stella Vetova
vetova.bas@gmail.com

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