Polyp detection system

COMPUTER VISION AND DEEP LEARNING IN MEDICINE

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Supervised by Sergey V. Aksenov

Hagen 2016
Motivation

- 700 000 cases of polyp’s formations per year
- 40% cases are lethal

Diagnosis method is colonoscopy
Objective and tasks

Objective:
Create a decision support system for an effective diagnosis of polyp’s formations

Tasks:
- Create a polyp detection system
- Test the system and improve the system properties
- Implement the system for the Tomsk medical institutions
Polyp Detection System

Related research:


Data set

Sources for data set:

- Video frames from the CVC-ColonDB database
- Colonoscopy videos from Arizona State University
Candidate selection

Data Set

Candidate selection

Convolutional neural network
Polyp classification

Data Set  Candidate selection  Convolutional neural network
Experiments

Training set: 200 samples with polyps and 200 samples without polyps

Training by Adadelta during 25 minutes

Classifier error curve

Polyp classification examples
Results

- The Quality is close to the competitors’ quality
- The performance is 1.2 seconds per frame (The main competitor’s performance is 2.6 second per frame)
Conclusion and prospects

The polyp detection method based on computer vision and deep machine learning technique is implemented.

In the future:
- Use the image changes on video to localize the polyp position.
- Take into consideration the colon specialty.
- Design the parallel implementation by GPU computing technologies.
Polyp detection system

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