**Коэн Янив ИК-спектрография и томография тканей человека и их анализ методами машинного обучения**

ОГЛАВЛЕНИЕ ДИССЕРТАЦИИ

кандидат наук Коэн Янив

Contents

LIST OF ABBREVIATIONS

ACKNOLEDGMENTS

INTRODUCTION

The Relevance of the Research

The Objectives and Goals of Dissertation

The Scientific Novelty of the Study

The Practical Significance

The Key Findings of the Thesis to Be Defended

Methodology used in Dissertation

Authenticity of the results

The author's personal contribution

Approbation of Research Results

The list of the published articles where the main scientific results of the thesis are reflected

The Structure of Dissertation

CHAPTER 1. IR TOMOGRAPHY

1.1 Overview

1.2 Current State of the Art

1.3 Theoretical Background of the IR Tomography and IR Spectroscopy of Cancerous and Anomalous Biological Structures Detection and Identification

1.4 Cooling and heating of cancerous structures

1.5 Diameter and depth of the tumor

1.6 Experimental Clinical Tests

1.7 In-Vitro thermal imaging by use of Laparoscopic procedure

1.8 Results and Discussion

1.9 Conclusion

CHAPTER 2. DEVICES AND INSTRUMENTS

2.1 Field and background

2.2 Basic principles of FTIR-ATR detection

2.3 Information yielded

2.4 The means of operation

2.5 Brief Description of Medical I.R.O.S

2.6 Flow chart and short explanation

2.7 DATA BASE AND CLOUD PRESENTATION AND DESCRIPTION

CHAPTER 3. FTIR-ATR DATA CLASSIFICATION

3.1 Problem description: Cancer Detection

3.2 Data preparation and pre-processing

3.3 Machine Learning approach for classification

3.4 Partial least square regression (PLSR) and Principal component regression (PCR)

3

3.5 Training, calibration and validation

3.6 PCR/PLSR Summary

3.7 Linear Discriminant Analysis (LDA)

3.8 Naive Bayes classifier (NBC)

3.9 Conclusions of Machine Learning classifiers

3.10 Spectral biomarkers for discrimination between Normal and Malignant cells

CHAPTER 4. ARTIFICIAL NEURAL NETWORK

4.1 ANN concept - BASIC DEFINITIONS

4.2 Biological Neuron

4.3 Artificial Neuron

4.4 Multi-layer feed forward network

4.5 Feedforward error back-propagation Network

4.6 Basic MLFF network configuration

4.7 Feed-forward ANN classifier design

4.8 Network training Algorithms

4.9 Preliminary practical results

4.10 Conclusions

CHAPTER 5. SUMMARY

CHAPTER 6. PRACTICAL APPLICATIONS

CONCLUSION

REFERENCES

ANNEX: BACKGROUND TO THE SUBJECT