

An Iris based Pre-Diagnostic System for Dysfunctional Lungs

Presenter

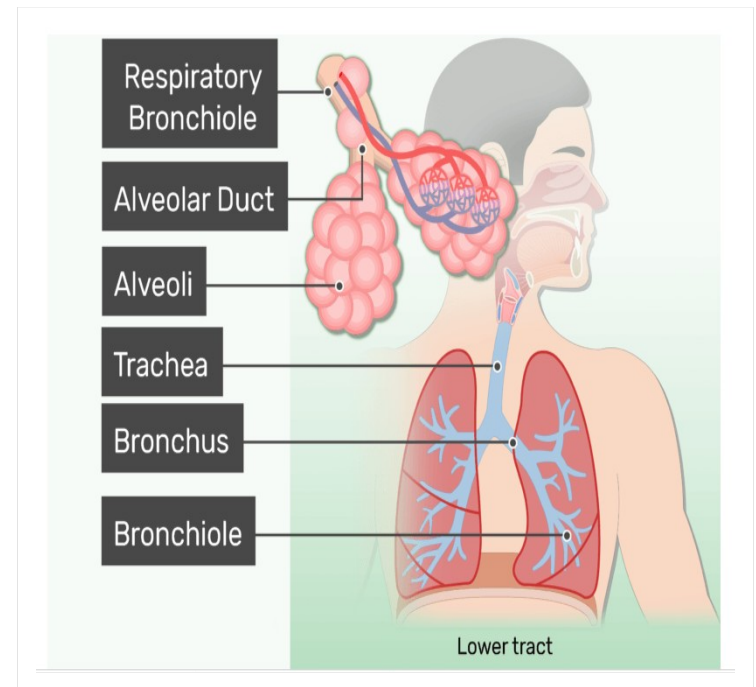
Abdul Malik Muhammad

Collaborators

Agenda

- Problem Statement
- Proposal
- Methodology
- Results
- Conclusion

Introduction to lungs



- ❖ One of the main respiratory system organs in the body is the lungs.
- ❖ Gas exchange happens where oxygen and carbon dioxide is moving to and from the blood stream .
- ❖ Healthy Lungs means healthy life .

Causes of lungs dysfunction and diseases

The lungs can have a wide range of problems that can stem from genetics, bad habits, an unhealthy diet and viruses.

- Obstructive Lung Diseases.
- Asthma.
- Lung cancer.
- Chronic obstructive pulmonary disease (COPD) .
- Lung infections.

Statistics

- According to the latest WHO data published on 2017 Lung Disease Deaths in Pakistan reached 56,666 or 4.65% of total death. Ranks Pakistan #12 in the world .
- Murtaza ,reported that from all over the world about 300 million people were asthmatic, while out of every 100 persons 5 were asthmatic in Pakistan.

Murtaza G, Qureshi A, Akmal N, Haroone S. Asthma: Etiologies, diagnosis and prevention. J Pharm Cosm Sci. 2013; 1(2): 19-23.

Conventional Lungs Diagnosis

- Bronchoscopy needle aspiration biopsy.
- Chest X-ray .
- Computed tomography (CT).
- Transbronchial needle aspiration (TBNA).

Issues with conventional methods

- Harmful
- Costly
- Time Consuming
- Expert Physicians

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Iris based Lungs Pre-diagnostic System

- A non-invasive methods of dysfunction diagnostic environment .
- Input Iris (Having Lungs Disorders and Healthy) .
- Iridology Map .
- Algorithm applies artificial intelligence techniques .
- Multi-core system .

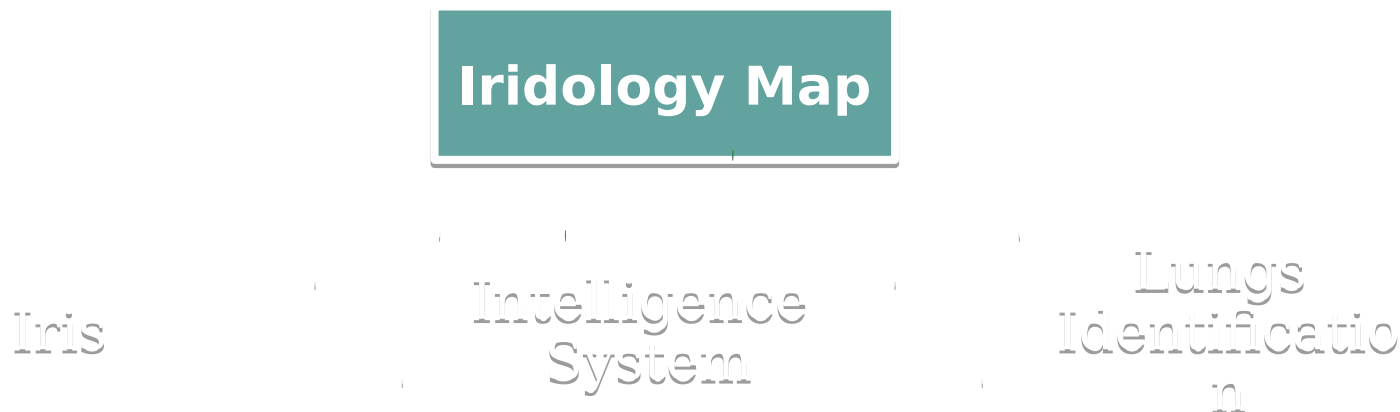


Figure: proposal image.

Iridology

- A science of analyzing the structure of the iris which reveals and locates weakness and inflammation in the body .Nerve fibers of the iris changes its shape and color to reflect the health of the body and indicate area of illness and injury .
- Every organ and part of the body are represented in the iris in a well-defined area .
- Whenever an issue occurs to the lungs function , metabolism and started to dysfunction a spot and irregular pattern starts to appears in the specific region in the iris .

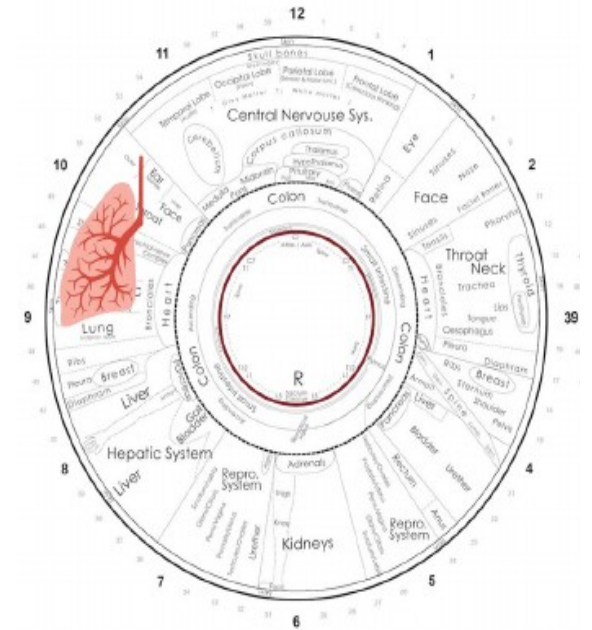
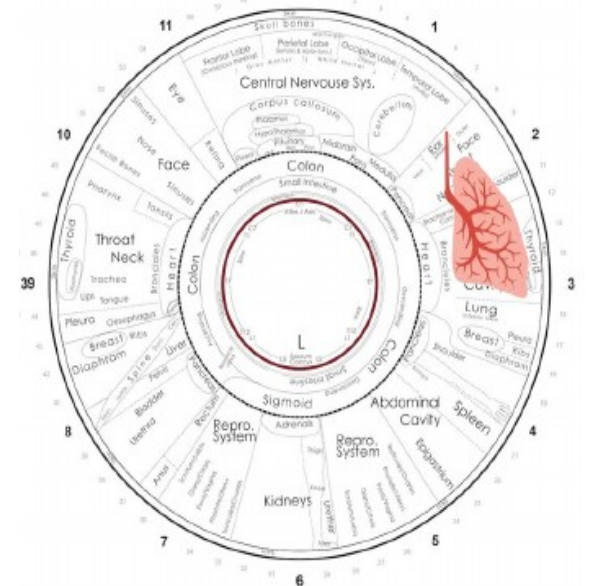


Figure: Iridology Chart. Every region in the chart delineates the particular organ inside the body [2].



Salient Features

- ❖ A non-invasive methods of identifying dysfunctional lungs .
- ❖ Performs operations in real-time .
- ❖ No need of expert physician .
- ❖ The algorithm applies Artificial Intelligence Techniques and Iridology Map .
- ❖ Multi-core system to execute the algorithm .
- ❖ Low-cost, stand-alone, easy to use and portable .

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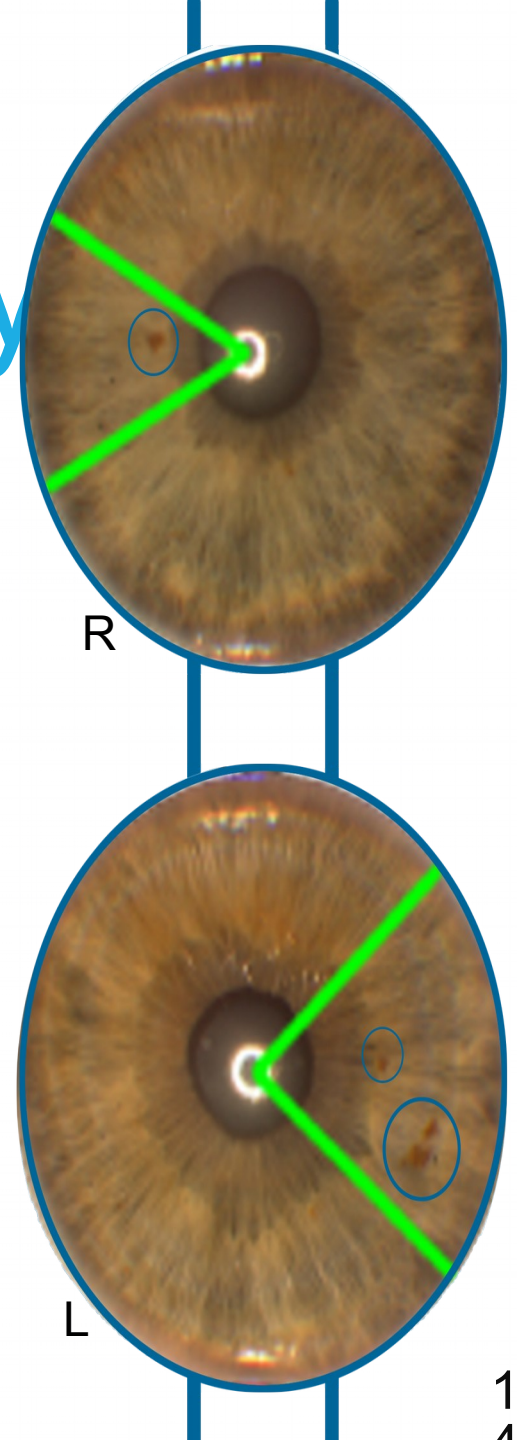
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Methodology

- Lungs Pathology
- Intelligent Algorithm
- Hardware Architecture

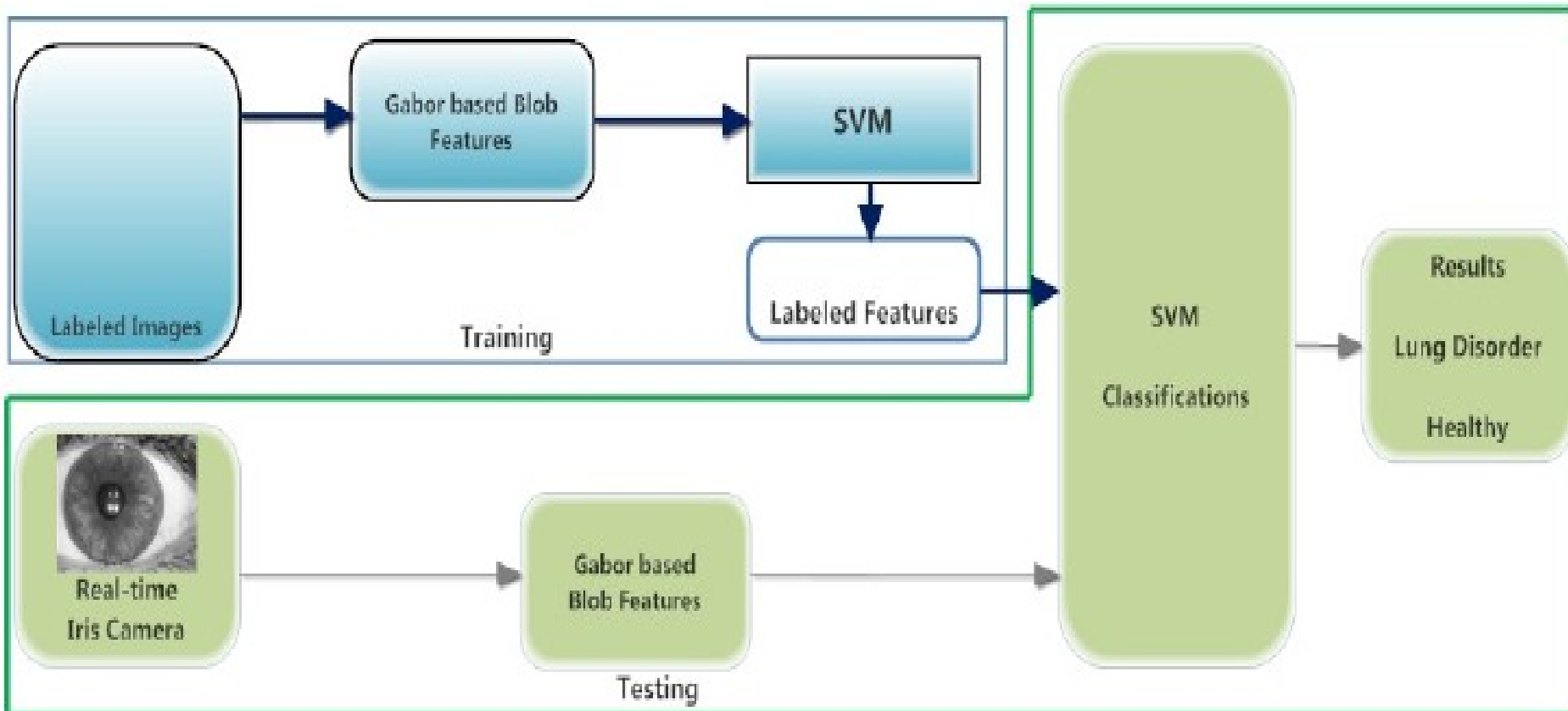
Lungs Pathology

- Lung disorders can be seen in the Iris regions between segment 2 and 3 in the left Iris after second concentric circle
- Between segment 9 and 10 in the right Iris.

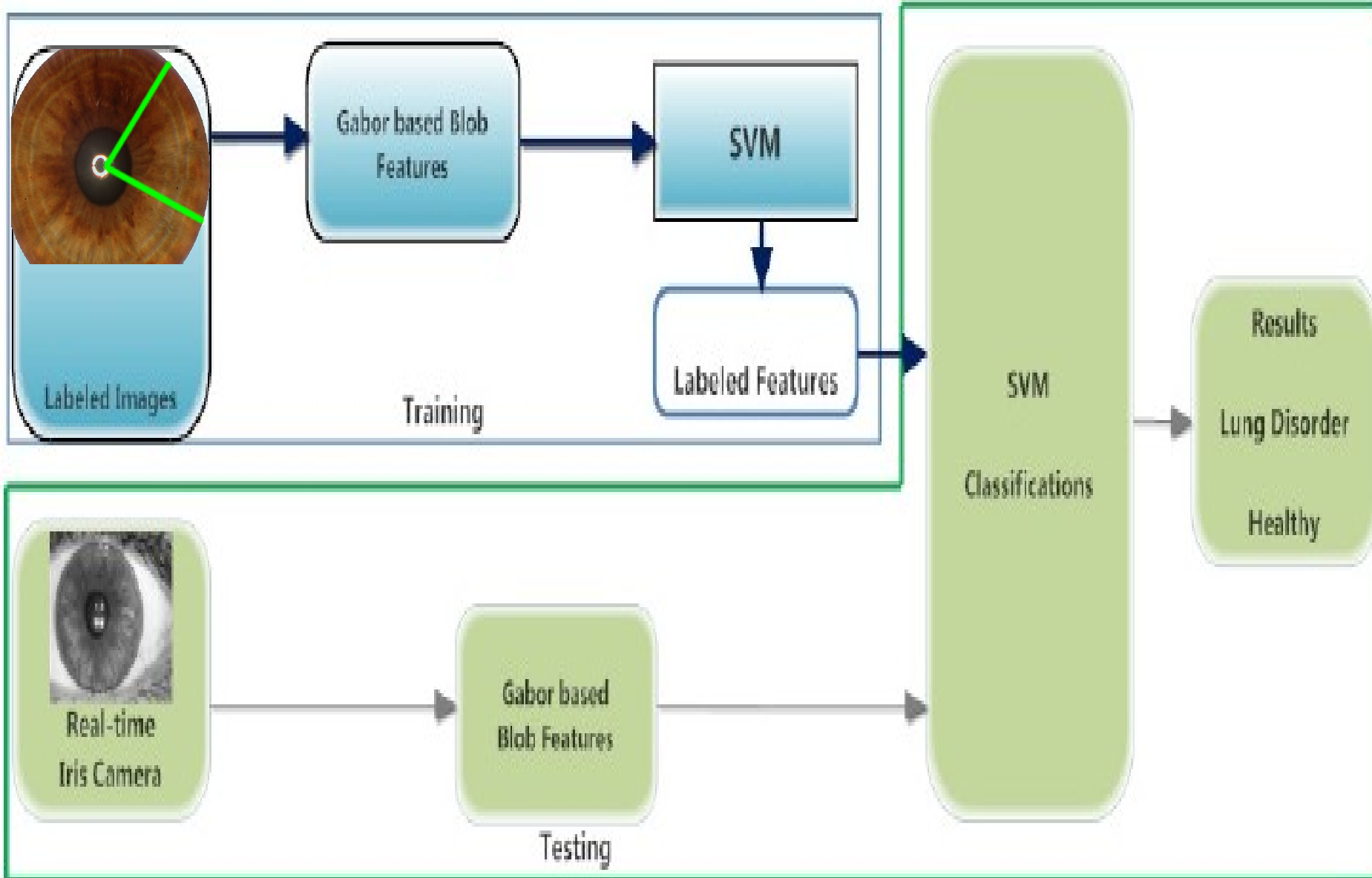


Intelligent Algorithm

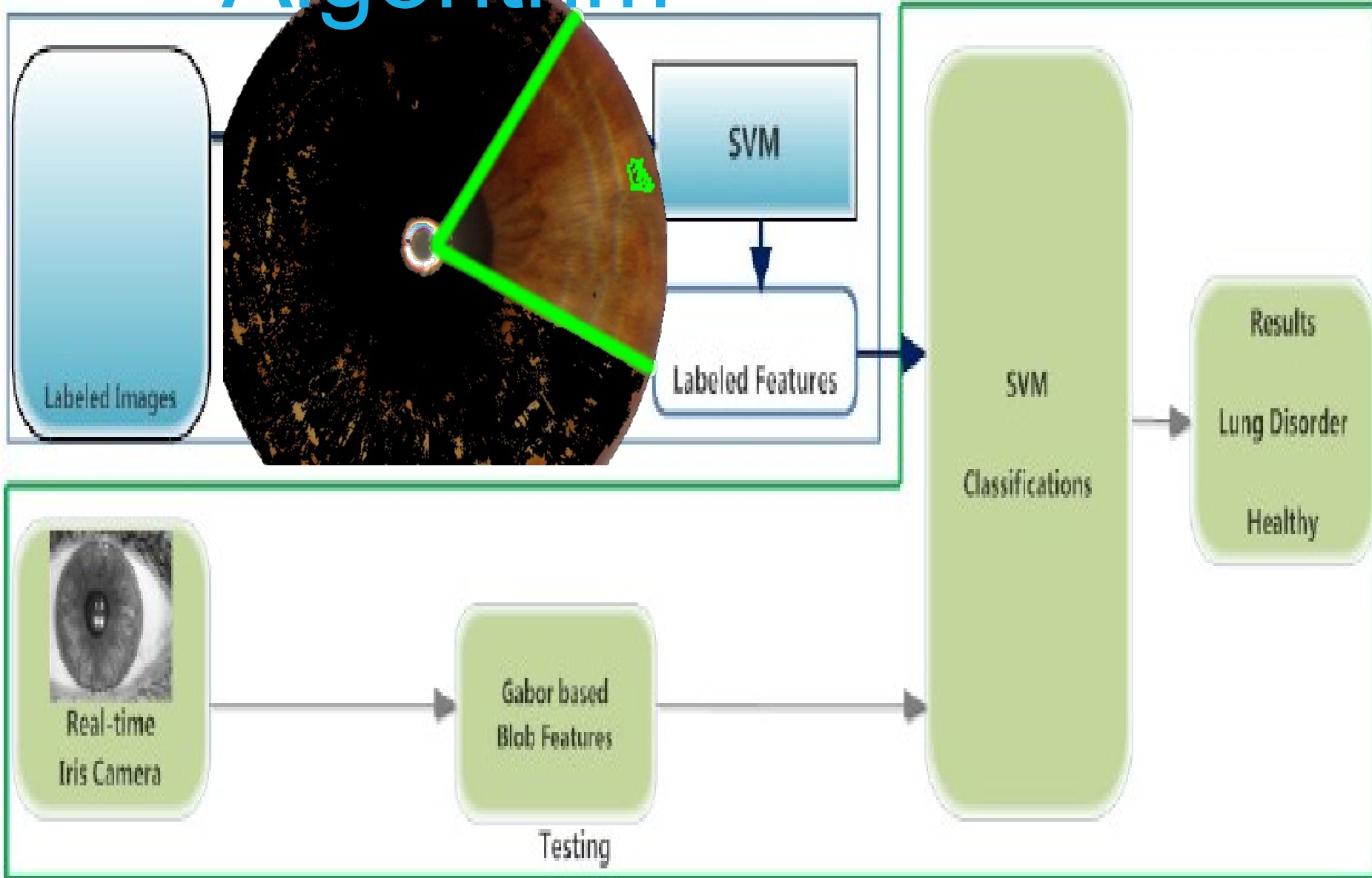
- Python 3.4 .
- OpenCV .
- Machine Learning Libraries scikit-learn .



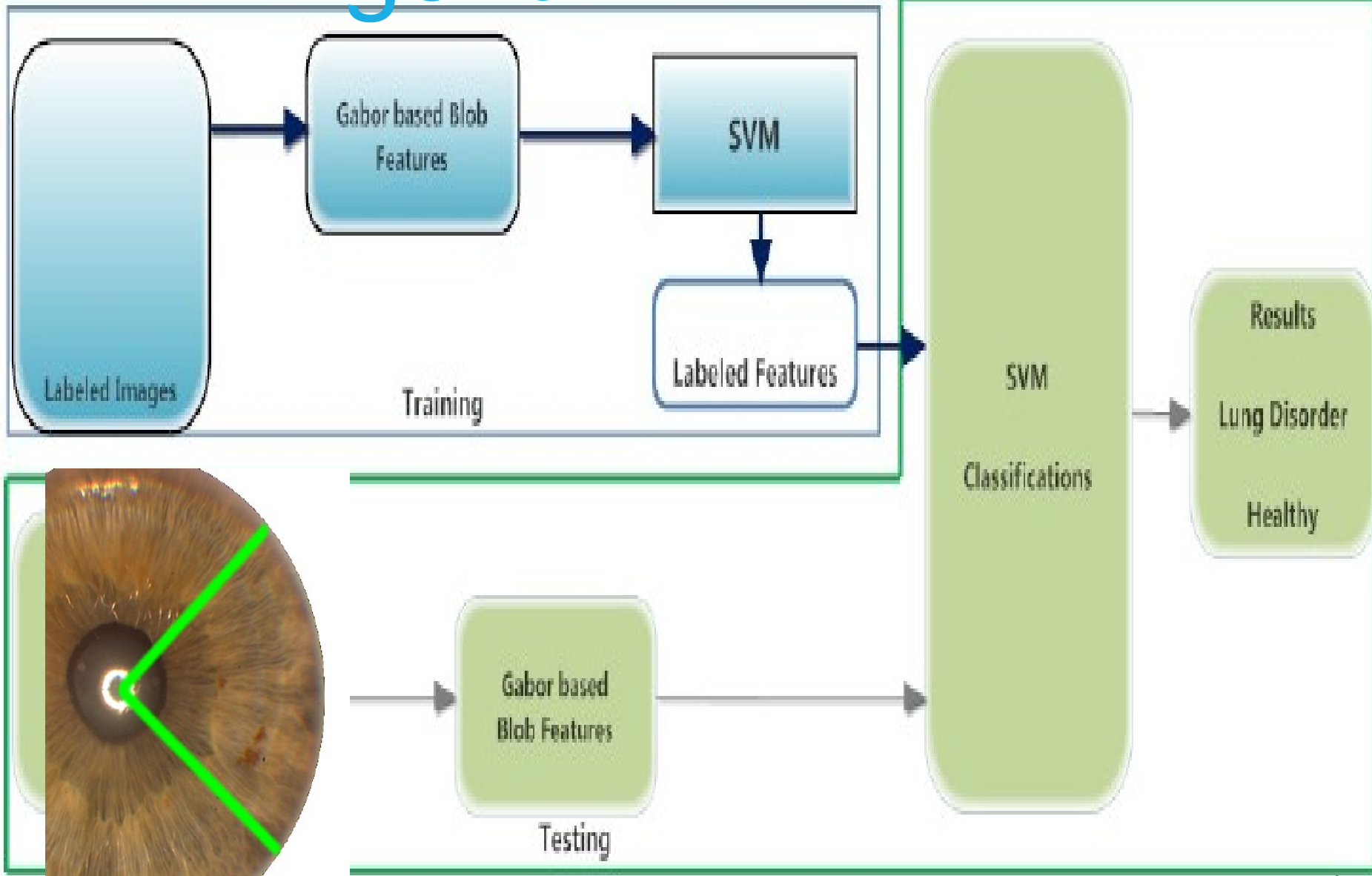
Intelligent Algorithm



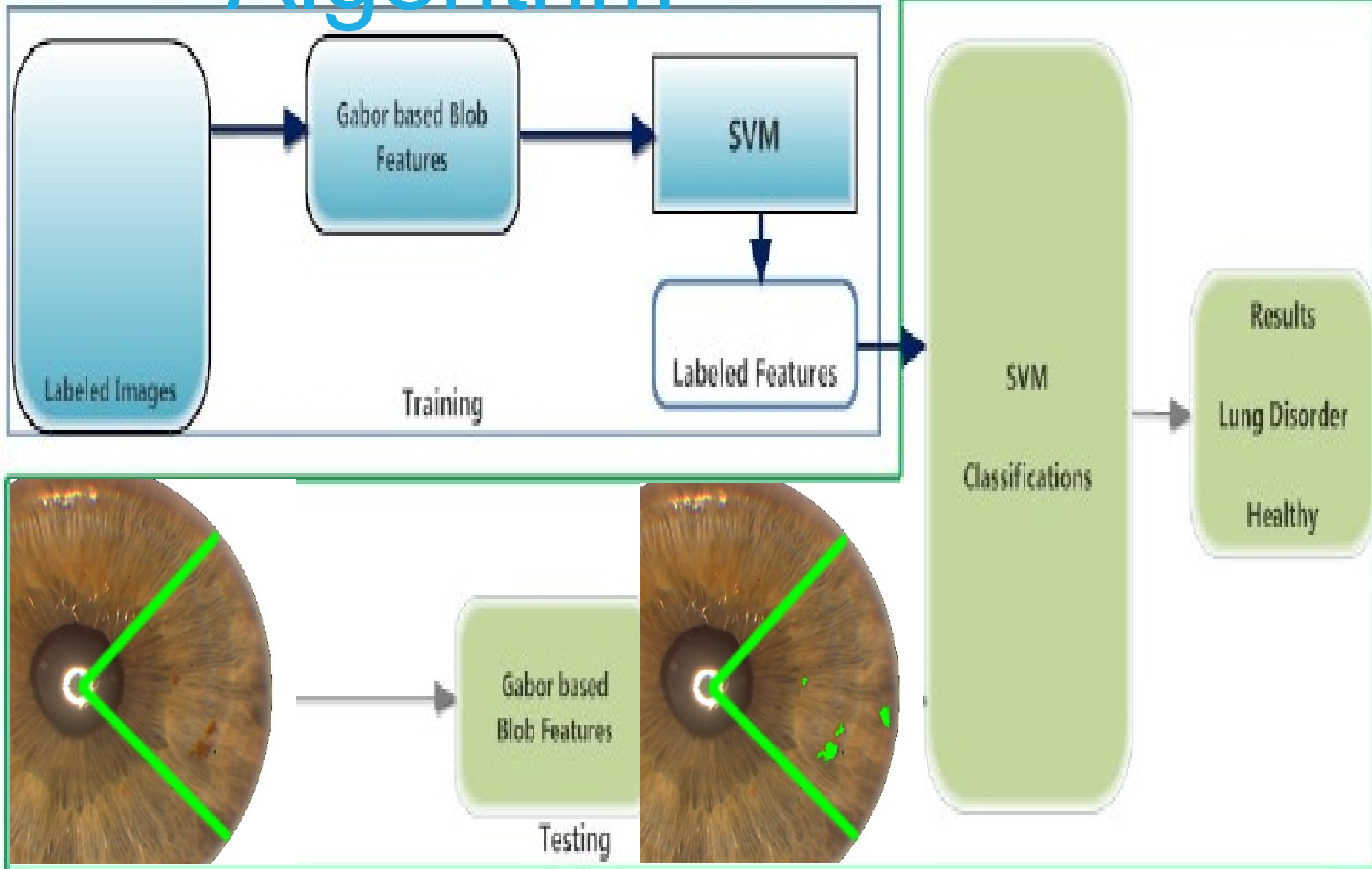
Intelligent Algorithm



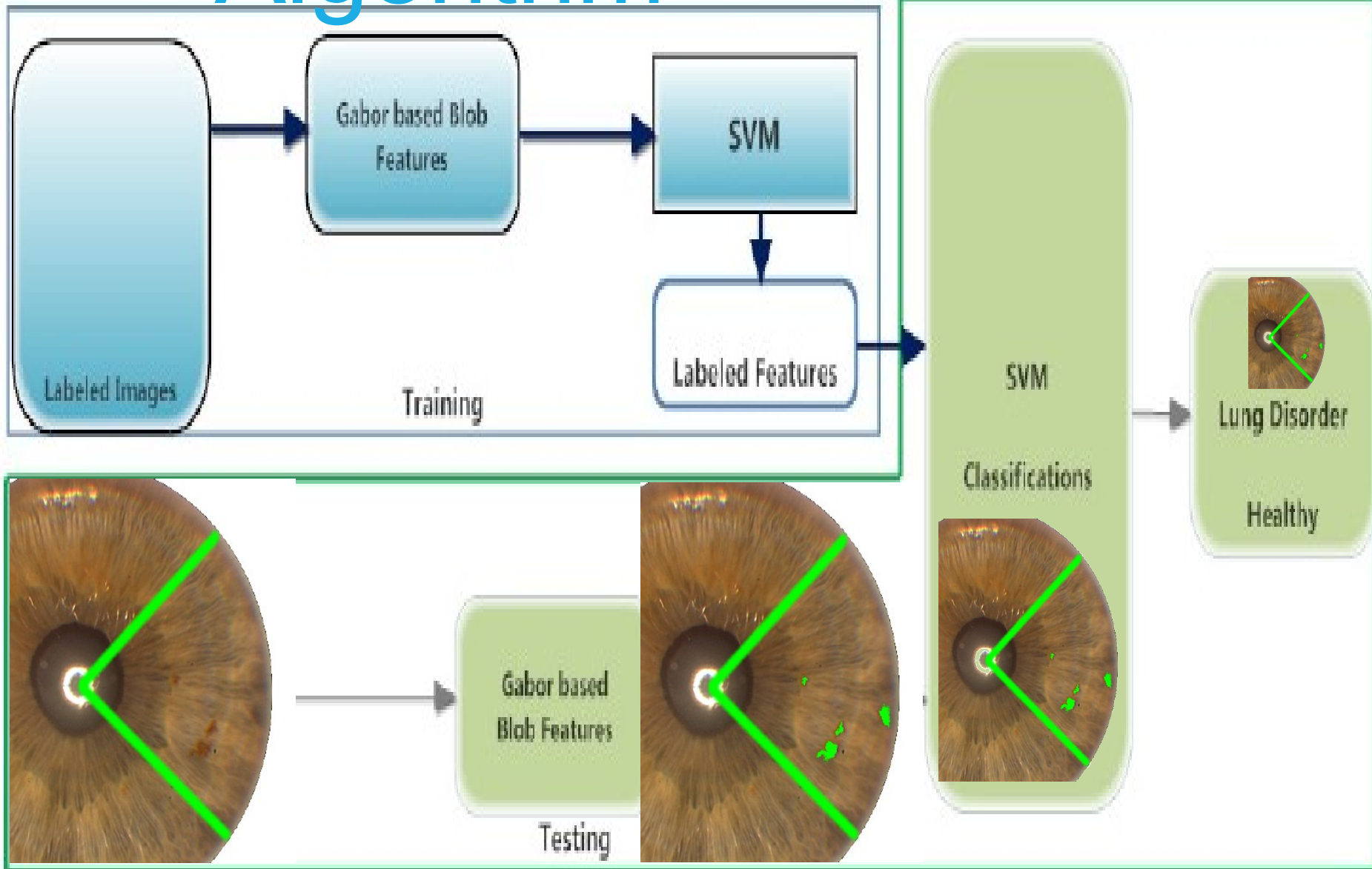
Intelligent Algorithm



Intelligent Algorithm



Intelligent Algorithm



Hardware Architecture

- GP-GPU Cluster
 - 9 Tera FLOPS
 - CPU Octa Core
 - GPU GTX 1080 2560 Cuda cores
 - 32 Giga Byte Main Memory
 - 512 Giga Byte SSD

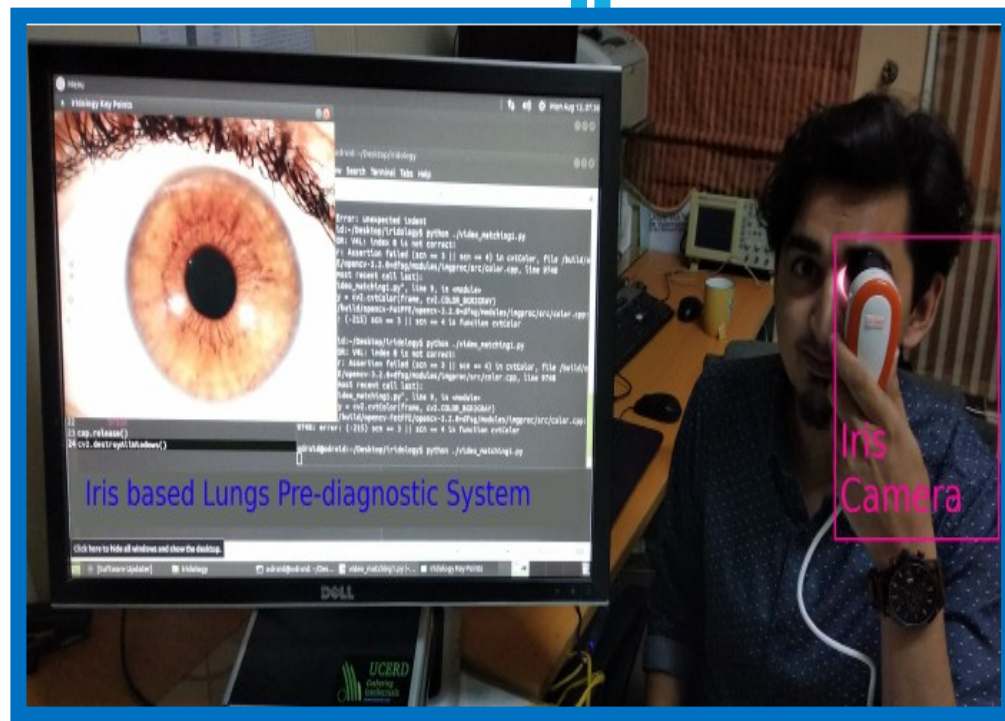


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Results

- ❖ Data-sets
- ❖ Training and testing time
- ❖ Classification Accuracy



DATA-SETS

- The data-sets are used to test the Iris based Pre-diagnostic System. The data-sets are further categorized into Training Data and Testing Data.
- Each data-set holds 100 iris images; 50 patients with lungs problems and 50 healthy subjects. Each iris image has resolution of 2560x1920 pixels.

Training and Testing Time

	Training Time (min)	Testing Time (min)
Data Set 100 Images	11.2	10.22

Classification Accuracy

Subjects	Healthy (50)	Dysfunctional Lungs (50)
Healthy (50) Diagnosed as	49	1
Lungs Dysfunctional (50) Diagnosed as	6	44

Classification Accuracy

- We measure the accuracy of the Iris based Pre-diagnostic System algorithm while processing the testing dataset.
- Results show that while processing the testing dataset of lungs patients and healthy subjects, the Iris based Pre-diagnostic System was able to **identify 44 subjects as having dysfunctional lungs**, whereas **49 healthy subjects** are correctly identified.

Discussion about accuracy

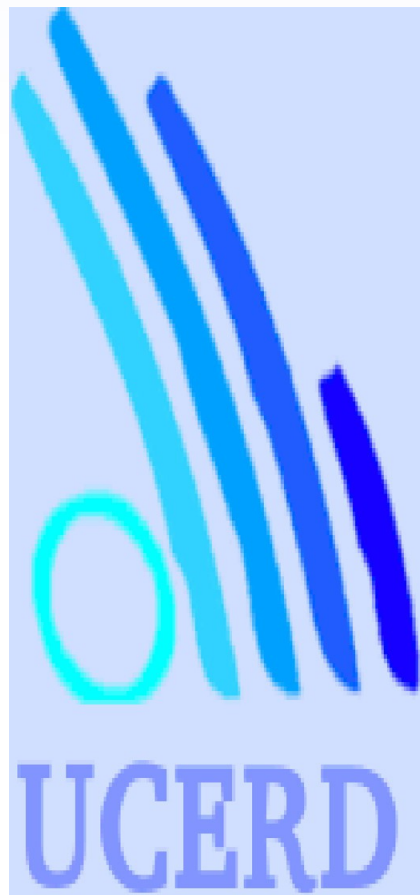
- ❖ Data Collection is an issue.
- ❖ Dysfunctional subject data base is not sufficient .
- ❖ Complete and accurate history of patients is not available.
- ❖ Experts and hospitals are difficult to convey them for cooperation.

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Conclusion

- ❖ An Iris based Lungs Pre-diagnostic System is proposed and developed.
- ❖ The proposed system identifies the dysfunctional lungs based on iridology map and machine learning algorithm.
- ❖ The system works in real-time environment and processes the algorithm on CPU-GPU based machine.
- ❖ The results confirm that 88% of the time the system accurately diagnoses a lung problem using iris images.
- ❖ The results of this research is published **IEEE conference** and in future planning to submit in Impact Factor Journal.



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