DIABETIC RETINOPATHY DETECTION USING EYE IMAGES

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Source: Kaggle
THE DISEASE

- DR is ocular manifestation of diabetes
- Growth of blood vessels
- Retina lacks oxygen
- Blood vessels may bleed, cloud vision, may cause blindness

Source: National Eye Institute, National Institutes of Health
SOME STATS

- 29.1 million in US and 347 in world have diabetes
- 40-45% of patient have some level of DR
- Affects to 80% who has 10 or more year diabetes
- So around 150 million have DR
- Accounts for 12% of all new cases of blindness

But things are still done manually
THE TASK AND CHALLENGES

• To classify a given image set as 0-4
• Large Datasets, high resource requirement
• Different kind of images
Dataset is generated by Eyepacs and Available at Kaggle.

http://www.kaggle.com/c/diabetic-retinopathy-detection/data

Dataset consists of-

- ~35,000 Images with different shades different camera
- score by trained professional.
PREVIOUS WORK

• Some work has been done on fundus images which varied accuracy (60-90%)
• No work has been done with random photographs.
METHODOLOGY

- Image processing and texture analysis
- Training with neural networks
IMAGE PROCESSING AND TEXTURE ANALYSIS

- Removed blanc space and reduced
- Created different classes of various versions highlighting features.
TRAINING WITH NEURAL NETWORKS

• Implemented using Dato’s GRAPHLAB
• Used different feature highlighting images from previous part
• To speed up deep learning is used
## Initial Results

<table>
<thead>
<tr>
<th></th>
<th>Dataset used for training</th>
<th>Dataset used for testing</th>
<th>classification</th>
<th>Correct classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 (No DR)</td>
<td>32</td>
<td>36</td>
<td>39</td>
<td>28</td>
</tr>
<tr>
<td>1 (Mild)</td>
<td>23</td>
<td>23</td>
<td>27</td>
<td>17</td>
</tr>
<tr>
<td>2 (Moderate)</td>
<td>21</td>
<td>25</td>
<td>23</td>
<td>18</td>
</tr>
<tr>
<td>3 (Severe)</td>
<td>12</td>
<td>6</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4 (Proliferative DR)</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>
FUTURE WORK

• Cuda can be used with NVIDIA GPU
• Will run for larger iterations
• Will try to apply better feature extraction techniques
REFERENCES

• M. Usman Akram, Shehzad Khalid, Shoab A. Khan, “Identification and classification of microaneurysms for early detection of diabetic retinopathy”

• Wong Li Yun, U. Rajendra Acharya, Y.V. Venkatesh, Caroline Chee, Lim Choo Min, E.Y.K. Ng “Identification of different stages of diabetic retinopathy using retinal optical images”

TOOLS USED

• GNU parallel
• Dato’s Graphlab
• Numpy
QUESTIONS AND SUGGESTIONS