Deep learning fundus image analysis for early detection of diabetic Retinopathy

(1)Diabetes is a globally prevalent disease that can cause visible microvascular complications such as diabetic retinopathy and macular Edema in the human eye retina, the images of which are today used for manual disease screening and diagnosis.

(2)This Labor-intensive task could greatly benefit from automatic detection using deep learning technique.

(3) Here we present a deep learning system that identifies referable diabetic retinopathy comparably or better than presented in the previous studies, although we use only a small fraction of images (<1/4) in training but are aided with higher image resolutions.

(3) We also provide novel results for five different screening and clinical grading systems for diabetic retinopathy and macular edema classification, including state-of-the-art results for accurately classifying images according to clinical five-grade diabetic retinopathy and for the first time for the four-grade diabetic macular edema scales.

(4)These results suggest, that a deep learning system could increase the cost-effectiveness of screening and diagnosis, while attaining higher than recommended performance.

(5)The system could be applied in clinical examinations requiring finer grading.

Proposed Solution

The following information may be useful to you in completing this portion of your team's work. Skim this section, then refer back to it as necessary

Begin by describing a significant real world problem that your audience can relate to. Show a concrete example of this problem. This will serve as a "hook" to get the attention of your audience and convince them of the importance of the project. Next you want to focus in on the part of the problem you want to attack. So follow your example by focusing on a small but significant portion of the problem. This is the part that you are proposing to tackle.

Proposed Solution

*Having hooked your audience into the problem, now you want to paint a picture of what the world will be like when you solve the problem.

* Your proposed solution should relate the current situation to a desired result and describe the benefits that will accrue when the desired result is achieved. So, begin your proposed solution by briefly describing this desired result.

Note: now that you have described the final result, think of your iterative enhancement plan as showing your audience the steps by which you will lead them to that result.

Instructions

With your teammates, write a two paragraph document:

1. The first paragraph should be a **problem statement** for your Capstone project.
    - This should be brief — a 100-word paragraph is typical.
2. The second paragraph should be a **proposed solution** for your Capstone project.
    - This should be brief — again a 100-word paragraph is typical.

In your document, strive for clarity and conciseness. Imagine that you are trying to convince a venture capitalist that they should fund this project.

PROPOSED SOLUTION This dissertation proposes a new method for object-oriented framework design and instantiation. In [19] Roberts and Johnson state that “Developing reusable frameworks cannot occur by simply sitting down and thinking about the problem domain. No one has the insight to come up with the proper abstractions.” They propose the development of concrete examples in order to understand the domain. The design strategy presented here is quite similar, analyzing concrete applications as viewpoints [8, 6] of a domain and deriving the final framework from the analysis of these viewpoints. The approach to framework design is based on the idea that any design can be divided into two parts: the kernel sub-system design and the hot-spot sub-system design. The kernel sub-system design is common to all the applications that the framework may generate, and the hot-spot sub-system design describes the different characteristics of each application that can be supported by the framework. The hot-spot sub-system uses the method and the information provided by the kernel sub-system and may extend it. The kernel structure is defined by analyzing the viewpoints design representations to produce a resulting design representation that reflects a structure that is common to all chosen viewpoints. This part of the design approach is based on a domain-dependent semantic analysis of the design diagrams to elicit the common features of the framework design structure, and is formally described in this dissertation. The elements that are not in the kernel are the ones that vary for each application, and depend on the use of the framework. These elements define the framework hot-spots [17, 20] that must be adapted to each related application. We defined new relationship in object-oriented design, called the hot-spot relationship, to specify all the hot-spots in the system. The semantics of this new relationship is given by the design patterns essentials [18]. This implies that the hotspot relationship is in fact a meta-relationship that is implemented through a design pattern that is generated taking into account the hot-spot flexibility requirements. The hot-spot cards guides this generation process, providing a systematic way for generating design patterns based on flexibility properties