

## DrishtiCare: A Telescreening Platform for Diabetic Retinopathy Powered with Fundus Image Analysis

Gopal Datt Joshi, M.S., and Jayanthi Sivaswamy, Ph.D.

### Abstract

#### *Objective:*

Diabetic retinopathy is the leading cause of blindness in urban populations. Early diagnosis through regular screening and timely treatment has been shown to prevent visual loss and blindness. It is very difficult to cater to this vast set of diabetes patients, primarily because of high costs in reaching out to patients and a scarcity of skilled personnel. Telescreening offers a cost-effective solution to reach out to patients but is still inadequate due to an insufficient number of experts who serve the diabetes population. Developments toward fundus image analysis have shown promise in addressing the scarcity of skilled personnel for large-scale screening. This article aims at addressing the underlying issues in traditional telescreening to develop a solution that leverages the developments carried out in fundus image analysis.

#### *Method:*

We propose a novel Web-based telescreening solution (called DrishtiCare) integrating various value-added fundus image analysis components. A Web-based platform on the software as a service (SaaS) delivery model is chosen to make the service cost-effective, easy to use, and scalable. A server-based prescreening system is employed to scrutinize the fundus images of patients and to refer them to the experts. An automatic quality assessment module ensures transfer of fundus images that meet grading standards. An easy-to-use interface, enabled with new visualization features, is designed for case examination by experts.

#### *Results:*

Three local primary eye hospitals have participated and used DrishtiCare's telescreening service. A preliminary evaluation of the proposed platform is performed on a set of 119 patients, of which 23% are identified with the sight-threatening retinopathy. Currently, evaluation at a larger scale is under process, and a total of 450 patients have been enrolled.

#### *Conclusion:*

The proposed approach provides an innovative way of integrating automated fundus image analysis in the telescreening framework to address well-known challenges in large-scale disease screening. It offers a low-cost, effective, and easily adoptable screening solution to primary care providers.

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**Author Affiliation:** Centre for Visual Information Technology (CVIT), International Institute of Information Technology, Hyderabad (IIIT-H), Gachibowli, Hyderabad, Andhra Pradesh, India

**Abbreviations:** (CSME) clinically significant macular edema, (DR) diabetic retinopathy, (NPDR) nonproliferative diabetic retinopathy, (PDR) proliferative diabetic retinopathy

**Keywords:** computer-aided diagnosis, diabetic retinopathy, fundus image analysis, screening, telescreening

**Corresponding Author:** Jayanthi Sivaswamy, Ph.D., Centre for Visual Information Technology (CVIT), International Institute of Information Technology, Hyderabad (IIIT-H), Gachibowli, Hyderabad, Andhra Pradesh, India 500032; email address [jsivaswamy@iiit.ac.in](mailto:jsivaswamy@iiit.ac.in)