Computer Vision as a Service: Towards an Easy-To-Use Platform for Computer Vision Researchers

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Introduction

There have been very much interests in extracting image feature points in almost every computer vision application. The **S**cale **I**nvariant **F**eature **T**ransform (SIFT) is probably the most popular and widely applied feature detector which assists a variety of applications including object recognition, image registration, object localization, image forgery detection, panorama stitching, and 3D surface reconstruction. **SIFT as a Service** is a reusable, platform independent, and highly accessible software component which aims **R**apid **A**pplication **D**evelopment (RAD) and fast prototyping in computer vision. It will be useful for students and researchers with moderate to high-level computer vision skills. An Internet connection is all they need!

The **SIFT as a Service** is freely available at **http://siftservice.com** for any academic, educational and research purposes.

Objectives

- To facilitate fast prototyping and Rapid Application Development for computer vision students and scientists by a tiny service available through the Internet.
- To provide application-to-application interaction for a highly demanded computer vision algorithm.
- To make the computer vision algorithms available through both human-oriented and application-oriented interfaces.

System Design

- SIFT algorithm has basically four main stages as follows:

Step 1: Scale-space construction

Step 2: Stable features localization

Step 3: Gradient orientation

Step 4: Feature descriptors extraction

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Service Design

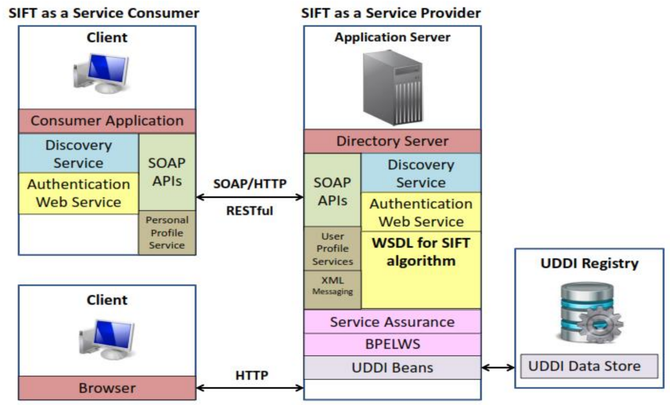

Figure 1. SIFT as a Service: Service architecture.

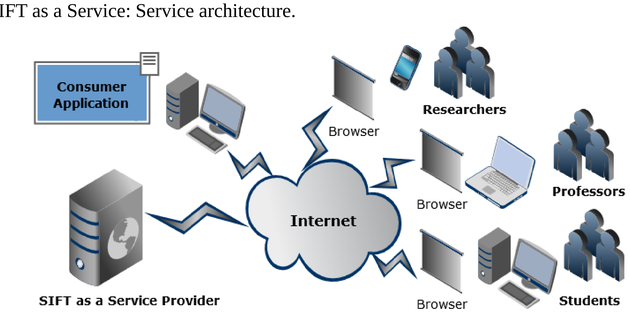

Figure 2. SIFT as a Service: Abstract view. Different group of users can get into the system using a browser, and developers may build a consumer application to call the SIFT as a Service without employing a browser.

Experimental Validations

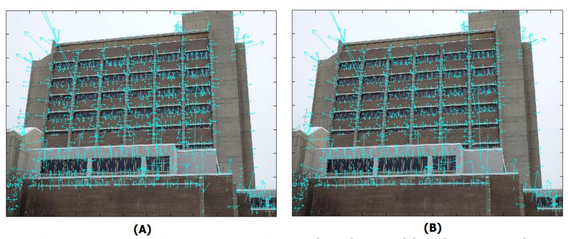

Figure 3. Accuracy in Feature Points Detection. **(A)** Results obtained by the original executable SIFT software implemented by David Lowe (number of features: 1638). **(B)** Results obtained by the SIFT as a Service (number of features: 1627). Image Set: EMS Building.

An Application: 3D Microscopy Vision

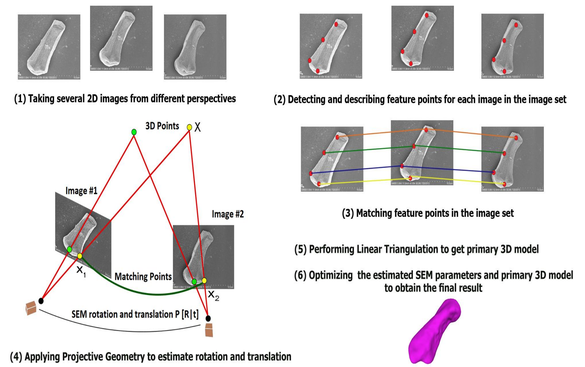

Figure 4. SIFT as a Service: An application.

siftservice.com Impact

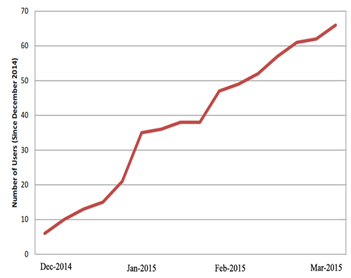

Figure 5. Number of users of siftservice.com from December 2014 to March 2015.

Conclusion

- We have novelly designed and developed the **SIFT as a Service**, a SaaS (Software as a Service) based component for a highly demanded computer vision algorithm.
- The service aims fast prototyping and Rapid Application Development (RAD) for computer vision scientist and students. An Internet connection is all they need!
- This contribution could be considered as an initial step towards the **Computer Vision as a Service,** an easy to use platform for computer vision researchers.

Bibliography and Patent Notice

The following patent has been issued for the SIFT algorithm embodied in the **SIFT as a Service** (**http://siftservice.com**): "**Method and apparatus for identifying scale invariant features in an image and use of same for locating an object in an image**," David G. Lowe, US Patent 6711293 (March 23, 2004). Provisional application filed March 8, 1999. Publication Number: US6711293 B1. Original Assignee: The University of British Columbia.