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# SHREC'15 Track: Scalability of Non-Rigid 3D Shape Retrieval

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**Abstract**

*Due to recent advances in 3D acquisition and modeling, increasingly large amounts of 3D shape data become available in many application domains. This rises not only the need for effective methods for 3D shape retrieval, but also efficient retrieval and robust implementations. Previous 3D retrieval challenges have mainly considered data sets in the range of a few thousands of queries. In the 2015 SHREC track on Scalability of 3D Shape Retrieval we provide a benchmark with more than* 96 *thousand shapes. The data set is based on a non-rigid retrieval benchmark enhanced by other existing shape benchmarks. From the baseline models, a large set of partial objects were automatically created by simulating a range-image acquisition process. Four teams have participated in the track, with most methods providing very good to near-perfect retrieval results, and one less complex baseline method providing fair performance. Timing results indicate that three of the methods including the latter baseline one provide near- interactive time query execution. Generally, the cost of data pre-processing varies depending on the method.*

Categories and Subject Descriptors (according to ACM CCS): I.3.3 [Computer Graphics]: Picture/Image Generation—Line and curve generation

## 1. Introduction

The experimental comparison of shape retrieval methods is important for the improvement of existing and the design of novel methods in this area. Regularly, experimental comparisons are carried out as part of the evaluation in technical publications, as well as the SHREC shape retrieval evaluation efforts. So far, shape retrieval evaluation has typically considered data sets of moderate size up to thousands of objects. For example, the dataset proposed in [LLL*14a] consisted of thousands of query and target objects, including 3D models and user queries. There, a large number of user query sketches was obtained previously by a crowd-sourced approach.

Considering scalable 3D retrieval is a relevant endeavor, as some 3D repositories like Sketchup 3D Warehouse [Ske] or TurboSquid [Tur] today comprise tens of thousands of shapes. Also, it can be expected that with increased availability of 3D acquisition facilities including crowd-based photogrammetric methods [GAF*10], or consumer-type sensors like Microsoft Kinect, large-scale shape retrieval will become important. Scalable approaches should provide *efficient* similarity computation and ranking, to answer user queries interactively. Also, and as a pragmatic aspect, scalable methods should work also *robustly* in a fault-tolerant way regarding outlying and degenerate models, as may be encountered when studying large-scale 3D repositories. The provision of large-scale retrieval benchmarks has recently been limited by availability of real data, which often is expensive to obtain.

In this track, we increase the number of query objects by an order of magnitude. Our benchmark is based on a set of

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