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3D Model Search Engine Technology

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ABSTRACT:

From computer-aided design (CAD) drawings of complex engineering parts to digital representations of proteins and complex molecules, an increasing amount of 3D information is making its way onto the Web and into corporate databases.

Because of this, users need ways to store, index, and search this information. Typical Web-searching approaches,can't do this. Even for 2D images, they generally search only the textual parts of a file, noted Greg Notess, editor of the online Search Engine Showdown newsletter.

However, researchers at universities such as Purdue and Princeton have begun developing search engines that can mine catalogs of 3D objects, such as airplane parts, by looking for physical, not textual, attributes. Users formulate a query by using a drawing application to sketch what they are looking for or by selecting a similar object from a catalog of images. The search engine then finds the items they want.

Key words:
3D objects,2D Images ,Proteins And Complex Molecules.

NTRODUCTION :

Advances in computing power combined with interactive modeling software, which lets users create images as queries for searches, have made 3Dsearch technology possible. This paper is about the techniques that help to search for 3d models.

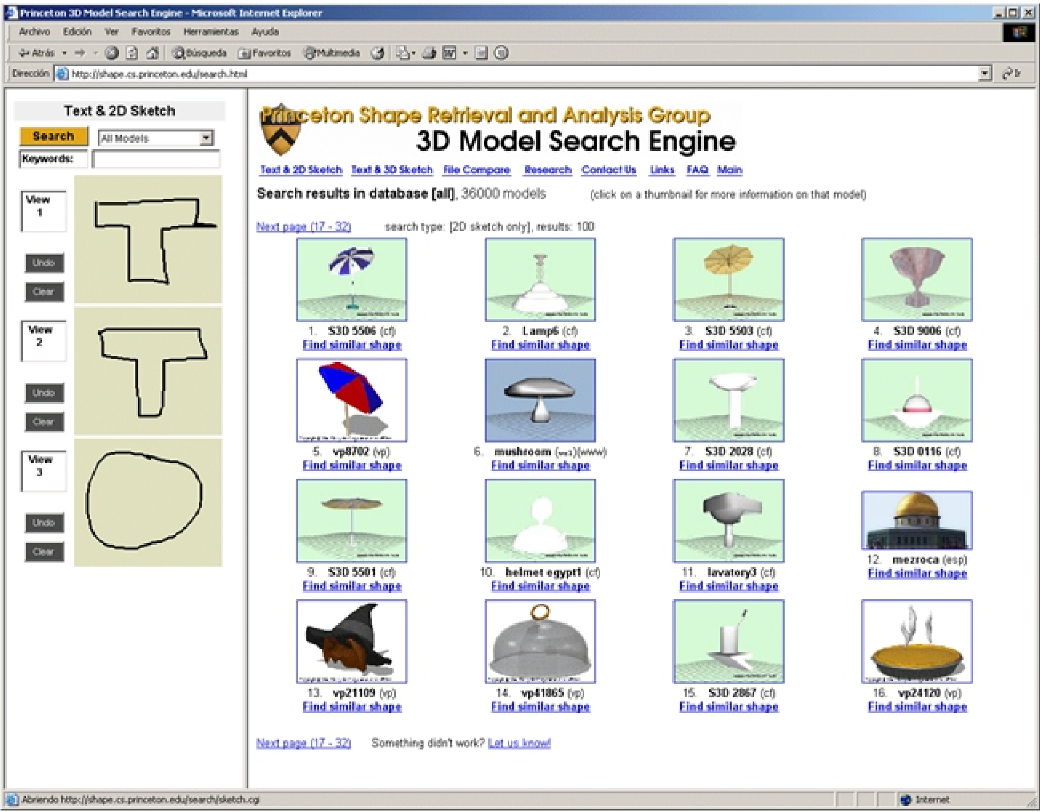
3D objects can be searched using shape-based queries.Query interfaces gives fast results if they are developed with the combination of 3D sketches, 2D sketches and text interfaces. The four procedures involved in query processing are crawling, indexing, querying and matching

Methodology used involves the following steps:

- Query formulation
- Search process
- Search result

Query formulation:

True 3D search systems offer two principal ways to formulate a query: Users can select objects from a catalog of images based on product groupings, such as gears or sofas; or they can utilize a drawing program to create a picture of the object they are looking for. or example, Princeton's 3D search engine uses an application to let users draw a 2D of the object they want to find.



The above picture shows the query interface of a 3D search system.

Search process:

The 3D-search system uses algorithms to convert the selected or drawn image-based query into a mathematical model that describes the features of the object being sought. This converts drawings and objects into a form that computers can work with. The search system then compares the mathematical description of the drawn or selected object to those of 3D objects stored in a database, looking for similarities in the described features.

The key to the way computer programs look for 3D objects is the voxel (volume pixel). A voxel is a set of graphical data-such as position, color, and density-that defines the smallest cubeshaped building block of a 3D image. Computers can display 3D images only in two dimensions. To do this, 3D rendering software takes an object and slices it into 2D cross sections. The cross sections consist of pixels (picture elements), which are single points in a 2D image. To render the 3D image on a 2D screen, the computer determines how to display the 2D cross sections stacked on top of each other, using the applicable interpixel and interslice distances to position them properly.

The computer interpolates data to fill in interslice gaps and create a solid image.This thesis describes an online search engine for 3D models, focusing on query interfaces and their corresponding model/query representations and matching methods. A large number of 3D models has already been created, many of which are freely available on the web. Because of the time and effort involved in creating high quality 3D model, considerable resources could be saved if these models could be reused. However, finding the model you need is not easy, since most online models are scattered across the web, on repository sites, project sites, and personal homepages.

To make these models more accessible, we have developed a prototype 3D model search engine. This project serves as a test bed for new methods in web crawling, query interfaces, and matching of 3D models. This thesis focuses on query interfaces and their accompanying matching methods. We investigated query interfaces based on text keywords, 3D shape, 2D shape, and some combinations. By testing matching methods that use text, 3D shape, and 2D shape, we found that the 3D shape matching method outperforms our text matching method for our application domain, due to the insufficient text annotation of 3D models on the web. Furthermore, classification performance was improved by combining the 3D shape- and text-based matching methods. The results of a user study also suggest that text can combine with shape to make queries more effective. We compared shape matching methods based on matching multiple 2D projections of a 3D model and found that from a set of side, corner and edge projections, the combination of side and corner projections produced the best results. However, these results were still worse than those of the 3D shape matching method.

We present a 2D structural interface and accompanying matching method that produces better classifications than image matching for certain types of objects. This prototype search engine has been used extensively across the world (in 18 months, almost 300,000 queries have been processed from more than 100 countries) and has proven to be useful (models have been downloaded over 50,000 times, and almost 30% of all visitors per day are returning users).

Search result:

In deciding what to show the user on a results page, several factors have to be considered. The user should have enough information about each model to be able to determine if it is interesting or not, without using too much bandwidth.Single results page should show as many models as possible without appearing cluttered. The most information would be provided if each model were shown in its own small 3Dviewer (e.g. a VRML plugin), but this would require a high-performance PC at the user's end and a high bandwidth connection (to transfer the potentially large model _les).

The least possible amount of information is just each model's name, which in most cases is insufficient. We chose to provide model information at two levels of detail: the _rst is a page with 16 results, shown as a 4 by 4matrix of labeled thumbnail images (of 128_96 pixels each). This results page occupies about625_825 pixels of screen space (with the query interface the total width is about 900 pixels).

The next level of detail is shown after the user clicks on a thumbnail image on a results page. This brings up a window with more information about that model: eight 160_120 thumbnail images from different viewpoints and in different rendering styles (which can each be enlarged to 640_480), links to the model and its referring page, polygon count information, and the text associated with the model and the text associated with the model.

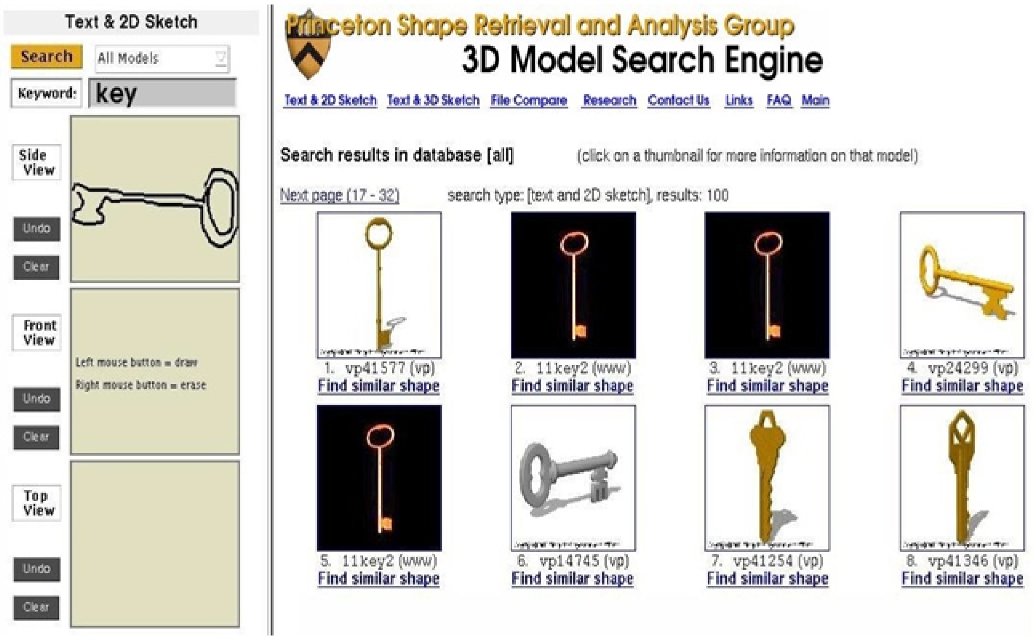
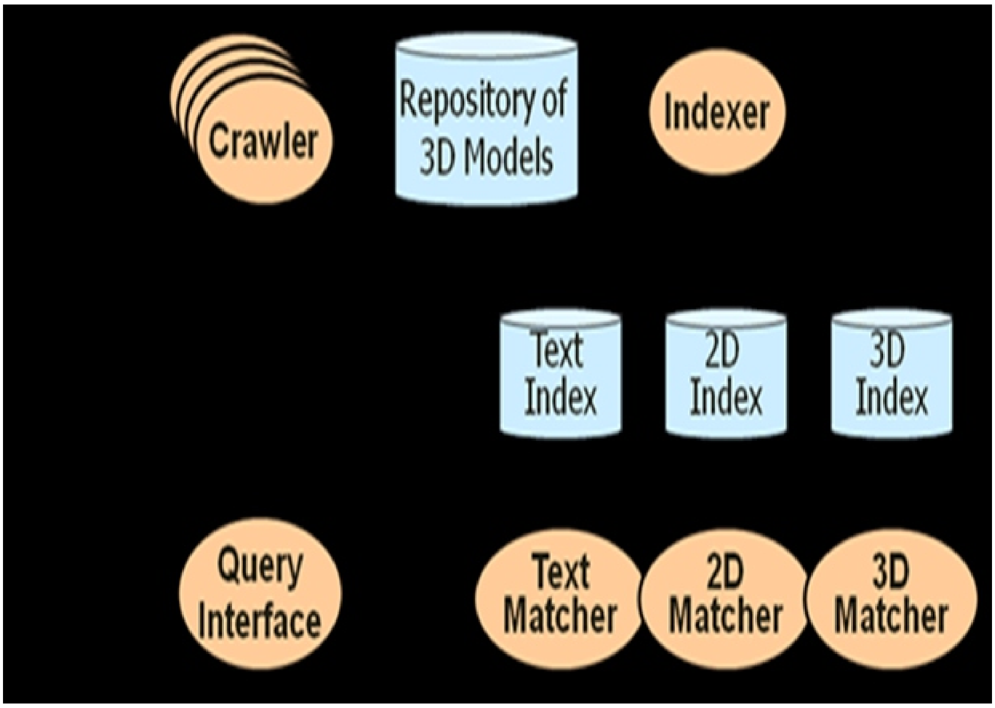


Figure : A 3D Model Search Engine, with an example query and some resulting 3D models

SYSTEM OVERVIEW :

The execution of the system proceeds in four steps: crawling, indexing, querying and matching. Crawling and indexing takes a lot of time. So these steps are done o_-line. Querying and Matching is done for each user query at run time.

The main research issue at the heart of this System is how to provide shape based query interfaces and matching methods that enable easy and sufficient retrieval of 3D models from a large repository.



MATCHING METHODS:

Query interfaces can be developed depends on using text interface or using 3D or 2D sketches. Text matching: Searching can be done using text keywords, which is very common query interface using on web.

For each 3D model corresponding text document is placed on the database. Search results can be fetched by matching the user entered text with the 3D models respective text document in the database.

2D shape descriptor matching:

Results are fetched by computes the 2D shape descriptors based on the 2D sketches given by user as an input. User can give input in 3 ways i.e., front, top or side view of a 2D sketch which in turn transformed into boundary descriptors.

These boundary descriptors compared with the existing boundary descriptors in the database and fetch the search results.

3D shape descriptor matching: Results are fetched by computes the 3D shape descriptors based on the 3D sketches given by user as an input. 3D model preprocessed shape descriptors exists in the database are compared with the computed 3D shape descriptors and fetches the search result.

CONCLUSION:

3D objects can be searched with the help of either using 3D sketches or 2D sketches or text interfaces. A user mostly uses the text interface rather than using 3D or 2D sketches as an input. But in fact, searching using 3D sketches fetches the search results with more speed when compared to the remaining two but users draw and give 3D sketches as an input accurately.

REFERENCES:

[1] 3D Cafe. 3D Cafe free 3D models meshes. http://www.3dcafe.com.

[2] Alias Wave front. Maya. http://www.aliaswavefront.com.

[3] AltaVista. Altavista search engine. http://www.altavista.com.

[4] D. Anderson, J. L. Frankel, J. Marks, A. Agarwala, P. Beardsley, J. Hodgins, D. Leigh, K. Ryall, E. Sullivan, and J. S. Yedidia. Tangible interaction + graphical interpretation: A new approach to 3D modeling. In Proc. SIGGRAPH, pages 393{402, New Orleans, LA, July 2000. ACM.