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DESIGN PHYSIOLOGICAL MODEL USING FUZZY LOGIC AND MATHEMATICAL CONCEPT

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ABSTRACT

Fuzzy Physiological Approach is a hard key problem in the industrial core domain of computer-aided design (CAD) applications. A work piece must be represented in some standard CAD object description format such that its representation can be efficiently used in a CAD process like redesign. The proposed task adopted Optimum Shape Operator (OSO) to use the fuzzy concept for creating a new CAD model. In this change, the optimization ranking of each vertex pair and furthermore maintain the features of optimized models. In the paper, we want to create new feature of physiological model using fuzzy set theory and mathematical concept.

***Keywords*:** Fuzzy design; Fuzzy model; Optimization theory; Fuzzy theory

INTRODUCTION

A prominent class of volume-oriented CADF MODEL systems employs Constructive Fuzzy Solid Geometry (FCSG). The FCSG principle is to construct complex CADF MODEL objects from primitive objects. The resulting FCSG objects represent physical that is solid, objects. Curved Fuzzy, like certain parts of car bodies, are typically represented by triangulations that are a Fuzzy approximation by plane triangles. Another well-known representation uses non-uniform rational B-splines (NURBS), which are especially apt for the construction of a smooth curved Fuzzy by smoothly joining Curved Fuzzy[1, 2,3, 4]. NURBS have the de facto standard for smooth-Fuzzy representations in the CADF MODEL world.

They are a powerful tool for geometric design tasks, because they are fast to calculate, numerically stable and allow a rather intuitive use. CADF MODEL Fuzzy, like a saddle Fuzzy, while a volume-oriented Object is constructed by combining CADF MODEL volumes, like a sphere. Accordingly, there are Fuzzy or volume oriented CADF MODEL systems and hybrid systems used by a construction engineer for operating on such CADF MODEL objects. Many CADF MODEL objects mainly consist of primitive CADF MODEL objects like spheres, cylinders, cuboids or torus[4,5]. Thus, a CADF MODEL system provides corresponding object libraries and supports the manipulation of such objects.

Fuzzy design that is the automatic construction of a CADF MODEL object from data is a hard and industrially relevant problem. The task being considered in this paper is the design from a given 3D point data set. The problem core is that, in any given set represents infinitely many different geometrical Fuzzy, that is those and only those Fuzzy that have the set in common. However, the data set represents only one physical Fuzzy, which is the Fuzzy of that physical object from which a digitizing process generated the data set. Thus, a Fuzzy-design system must reconstruct a CADF MODEL object that approximates the physical object[6,7] .This corresponds to the task of recognizing a physical object in a 3D point set, which is a special case of pattern recognition. The system must perform this task such that a construction engineer can start working with the resulting CADF MODEL object without being forced to introduce an expensive manual modification to the representation[8,9]. Following is the problem identification for the present work, the scope and methodology

Lets the Neighbor vertex is (v_j) and their adjacent vertex's are {v_1, v_2, v_3,………… v_i). Where v_i {v_1, v_2, v_3,…………), {v_i {v_1, v_2, v_3,…………) }.
if { $U(v_1)$, $U(v_2)$, $U(v_3)$, …………… $U(v_k)$} are unit normal vector of each vertex's v_i. Therefore
$U(v_k)$ { $U(v_1)$, $U(v_2)$, $U(v_3)$, …………… $U(v_k)$},
{$U(v_k)$ { $U(v_1)$, $U(v_2)$, $U(v_3)$, …………… $U(v_k)$}
Where i and k are the positive integer values
{(i, j) (1, 2, 3, ……..n) }.
If the vertex's (v_i) connected two or more than two edges (e_1, e_2, e_3,…………………e_n),

Therefore at least {v_1 (e_1, e_2) or v_2(e_1, e_2, e_3) or (v_i) (e_1, e_2, e_3, …..…………e_n)},
Now
{(v_i) (e_1 e_2 e_3 ……..…………e_n) }, and for the common edges of triangle
{(v_i) (e_1 e_2 e_3 ……..…………e_n) },
{ (v_i) (e_1, e_2, e_3, ……..…………e_n)}.
Where e_1, e_2, e_3, ……..…………e_n are the edge weight.

Now optimum shape operator of the vertex along the curve (v_1, v) is defined as

$$|| S_p(\overrightarrow{vv_1}) || = \frac{|| U(v_1 - U(v)) ||}{|| vv_1 ||}$$

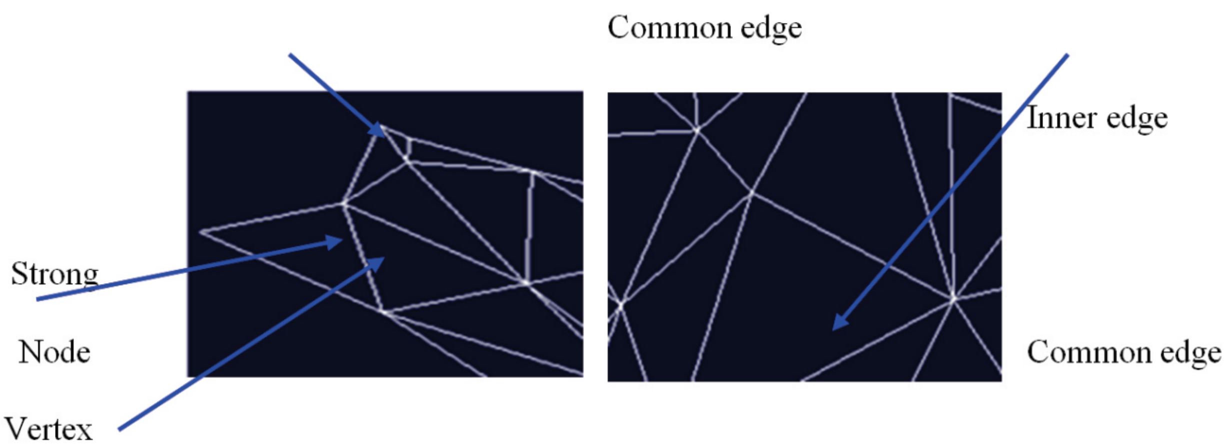

Figure1.1 (a) Common vertex's triangle (b) Common edges triangle

The shape operator $S_p(\overrightarrow{v_1v_2})$ of the vertex v on the curve of (v_2, v) is

$$S_p(\overrightarrow{v_1v_2}) || = \frac{|| U(v_2) - U(v) ||}{|| \overrightarrow{vv_1} ||}$$

, similar shape operator for k^{th} vertex

$$|| S_p(\overrightarrow{v_1v_k}) || = \frac{|| U(v_k) - U(v) ||}{|| \overrightarrow{vv_k} ||}$$

and for $(k+1)^{Th}$ vertex

$$|| S_p(\overrightarrow{v_1v_{k+1}}) || = \frac{|| U(v_{k+1}) - U(v) ||}{|| \overrightarrow{vv_{k+1}} ||} .$$

Now optimum shape operator for all vertexes

$$|| S_j || = \frac{\sum_{i=1}^{k} (|| v_i - v || S_p(\overrightarrow{w_k}))}{\sum_{i=1}^{k} || \overrightarrow{v_i - v} ||} = \frac{\sum_{i=1}^{k} (|| U(v_i) - U(v) ||)}{\sum_{i=1}^{k} || v_i - v ||}$$

CALCULATE TOPOLOGICAL ERROR OF KNOT VERTEXES

get (S_j, k, H_s, e, n) initialized variable
train for n steps - (end of first stage)
Topological error T_v
if (T_v> T_{th})
form adjacency edge and reorder variable
end - (end of topology correction if required)
do
classify and separate
S into point subsets S_1, S_2,…………S_k using variable
find (S_p for S_i, i 1………n)
get (S_1, S_2, ... S_j) find (v_i such that e_i is max)
insert reference vectors near v_i,
modify k and adapt node variable
while (less than max triangle)
end

Where $v_t$is the unit tangent vector of knot vertex, v_b is the unit binormal vector of knot vertex and v_n is the unit binormal vector of knot vertex; *k* is the curvature and is the torsion.

Geodesic Normals in Fuzzy Curved

Let *S* is homogeneous sample space and H_s is enumerated knot vertexes, therefore H_s is directly proportional to the mean curvature (concavity, convexity, vector of doubly curved Fuzzy,

$$< H_s(v_t, v_n), H_s(v_n, v_b), H_s(v_b, v_t) > \quad = 0$$

from

$$H = \frac{1}{2}\left[H_s(e_1, e_2) + H_s(e_2, e_2)\right]$$

Where e_1, e_2 are the orthonormal edges of triangular mesh of homogeneous curved Fuzzy.

Put $p =< H_s(e_1, e_1) >$ for each triangle

Science S is homogeneous doubly curved Fuzzy,

$$2D = \begin{pmatrix} H+p & 0 \\ 0 & H+q \end{pmatrix}$$

Here *D* is the geodesic normal distance

CALCULATE THE SPACE BETWEEN TWO POINTS CLOUDS

```
Getsurf (s1, s2) Initialize D, ds;
        Train (while (E= =0 to E = =1))
            {
          If ((G = =g = =D^2) && (E = G || F = = 0))
            {
                \\* Calculation for real and orthogonal Fuzzy *\\
Getnorm (G, g, D)    \\* for normal calculation *\\
      Dist (Getsurf (s1, s2))
     End
                }
            }
```

Where train, Getsurf are parametric recursive functions

Get *Pi*$_{:}$ *i*=1, 2….*s, k,* n_{max}, *, geodesic*

Termination Creatione$_{geterm}$, gen_{max}, fun_{max}

Var : u_i**:** i =1, 2…s and n

Dependent Var : x$_j$ ***: j=*** *1, 2,…(n+k+1) /* Calculate as per knots method*/*

Init: *initialize super close points t=1;*

While n_1 ==n_j=2,3,….*geodesic* | gen_t<= gen_{max} */* From equation 5.7*/*

Evaluate $e_{rms,}$ from equations

$$fitness = \frac{1}{1 + s.e_{rms} + \lambda.\psi};$$

t = t + 1;

end;

Var : u_i**:** *i* = 1, 2….s *Const : n =* n_{opti}

Dependent Var : x$_j$ ***: j=*** *1, 2,…(n+k+1) /* Calculate as per knots method*/*

While ($e_{rms} \geq e_{geterm}$|| gen_t<= gen_{max}**)**

Evaluate e_{rms}

$$fitness = \frac{1}{1 + e_{rms}};$$

t = t + 1;

end;

further t =1; /* Initialize variable */

While ($e_{rms} \geq e_{geterm}$|| gen_t<= gen_{max}**)**

Evaluate $e_{rms\,/}$* Optimize by Quasi-Newton method*/

t = *t* + 1;

end; end;

Performance report of five iterations runs algorithm with different parameters

Iterations	I	II	III	IV	V
Max joins distance	1.000	0 .090	0 .010	0 .009	0 .001
Max bridge distance	1.980	1.250	1.010	0 .871	0 .213
Consistency range	1.000	1. 000	1.000	1. 000	1.000
Tolerance	0.172	0.087	0.025	0.012	0.00

Table1.1: Performance Report of runs algorithm

CONCLUSION

As the dataset we have analyzed is in the form of numerical vertexes for design fuzzy logic and the number of windows has been predefined, the fuzzy concept algorithm of shape optimization has been considered for the classification of the same. Although in general, vertexes distance has been used in the fuzzy shape optimization algorithm, we tried it with two more distances namely Max joins distance and Max bridge distance to see the differences in the table. It has been reflected in the results as Consistency range and Tolerance.

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