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A Glossary of Vision Terms

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All programs are found on the Vision tape in the file noted under the program name. Underlined terms are included in the glossary.

A

A global variable used to generate ellipses.

Angbtn (Subr)
Angles New
LPSBRS 4-21

(Angbtn P1 P2 P3) P_i are points. Returns θ where:

θ radians

Arrayp (Expr)
Region Subrs

(Arrayp Name Arg L) Where L = $(n_1 n_2 \ldots n_j)$

Approximately (Array (Eval Name)(Eval Arg) $n_1 n_2 \ldots n_j$). Prints an error message if there is insufficient room.

B

A global variable used to generate ellipses.

Bind (Expr)
Gen Stuff

(Bind L_1 L_2) where L_1 is a list of atoms and L_2 is a list of S-expressions. Bind binds the values of the S-expressions (they too may be atoms) to the atoms.

Bindq (Fexpr)
Gen Stuff

(Bindq $(A_1 A_2 \ldots A_n)$ $(S_1 S_2 \ldots S_n)$).
Same as: (Bind (Quote $(A_1 A_2 \ldots A_n)$)
Quote $(S_1 S_2 \ldots S_n)$)).

Body

A semi-global variable assumed by iterate to name an expression to be repeatedly evaluated.

Bndry (Fexpr)
Region Subrs

(Bndry A) Approximately equivalent to: (Setq A (Cons Den (Cdr (Region Pt Pred Lowpt Uppt)))).

Boundary

A connected set of points of a region all of which neighbor points outside the region. (Points diagonally across from each other in a square are not connected but they are neighbors).

Bstcrv (Expr)
Bstcrv 4-21
LPSBRS 4-21

(Bstcrv L) where L = (Ind L_1); and L_1 = (P_1 P_2 . . . P_n); Ind ϵ {0 1 2 } for straight line, concave, convex; P_i are points. If Ind = 0 Bstcrv is the identity function. Otherwise, if the points can be approximated by a circular or elliptical arc, Bstcrv yields: (IND 'ELLIPSE' P_0 n_1 n_2 α P_1 β) where:
IND is unchanged;
'ELLIPSE' is the type of curve, as opposed to hyperbolic; P_0 is a point representing the center of the ellipse; n_1 is a LISP number for the length of the principal semi-axis;
n_2 is for the secondary semi-axis;
α is an angle $-\pi/2<\alpha\leq\pi/2$ measuring the tilt of the principal axis from the horizontal, about the center of the ellipse;
P_1, β specify the segment of the curve in the following manner: "beginning at point P_1 and using P_0 as center point, take β radians about P_0, in the clockwise direction if IND = 1, otherwise in the counterclockwise direction. This is the relevant segment.
For second-degree curves which are not ellipses,

Bstcrv returns the general equation coefficients and the first and last points on the arc. E.g. (IND Name A B C D E P_1 P_2) where Name is Hyper or Parab and the best fit curve is $Ax^2 + Bxy + Cy^2 + Dx + Ey = 1$. Bstcrv requires floating point input points.

Callf (Fexpr)
Region Subrs

(Callf F_n Arg_1 Arg_2 . . . Arg_n)
(F_n (Eval Arg_1)(Eval Arg_2) . . . (Eval Arg_n)).

Circular list

$L = (L_1 . (L_2 . (. . . .(L_n . L) . . .)))$ is a circular list. (Cdr (Cdr (. . .(Cdr L). . .))) results in L, if there are n Cdr's.

Cleartab (Expr)
Region Subrs

(Cleartab) sets all Hashtab entries to Nil.

Complement (Expr)
Region Subrs

(Complement L_1 L_2) yields L_1' which is L_1 with all occurrences of elements from L_2 removed.

Cos (Expr)
Gen Stuff

(Cos X). Returns cosine of X radians.

Curve (Expr)
DT Etal

(Curve L) where L is a list of Bstcrv outputs representing a boundary to a region. Curve returns a name-- e.g. "funny looking thing" -- describing the shape of the region so bounded.

DD (Fexpr)
DT Etal
Conv 9

(DD M S). (DT (Quote M) (Quote S)).

Den

A global variable used to determine the density of points to be read from the vidisector. If Den is n, every n^{th} point is read.

Den (Fexpr)
Region Subrs

(Den X). Sets Den to X.

Disgen (Fexpr)
Region Subrs

(Disgen A L) where L = (d, L_1 L_2 . . . L_n) and L_i are lists of points. Using Dlist, constructs an array on A to plot the points in the L_i Assuming the scope is in parameter mode, initializes it to point mode for Dlist's instructions. Terminates display instructions by resetting scope to parameter mode and stopping display. The element d is a density number.

Disp (Fexpr)
Region Subrs

(Disp A) inserts array A at the head of Dislist (with a single cons) causing A to be interpreted by display mechanisms.

Display (Fexpr)
Region Subrs

(Display F_n Arg_1 Arg_2 Arg_3 . . . Arg_n).
Approximately: The sequence
i) (F_n (Quote Ptlist) Arg_2 Arg_3 . . . Arg_n)
ii) (Disgen Arg_1 Ptlist)
iii) (Disp Arg_1)

Dlist (Expr)
Region Subrs

(Dlist L M) where L is a list of points and M a number. Assuming an array Object and an index I generates instructions to the scope to display, in point mode, the points in L. Dlist first multiplies each coordinate of each point by M (assuming that the points had at one point been scale d). I is left pointing to that element of the array following the last one entered by Dlist.

DT (Expr)
DT Etal
Conv 9

(DT M S) where M is a model and S is a scene, it returns a series of L_i, where
L_i = ((Eval M) i IS (R_{i_1} . . . R_{ij_i}))Its Value

is a list of regions not used in found figures. Each L_i represents an instance of a figure in the scene which matches the model. In L_i, the R_{ij}'s are the regions which compose the figure. E.g. L_i might be "cube i is A C D.

ELLIPSE (Fexpr)
Gen Stuff

(Ellipse n_1 n_2 X_S Y_S p f). Sets up global variables to generate points of an ellipse. The ellipse has axes parallel to the coordinate axes. That parallel to the X - axis has length $2N_1$; the other has length $2N_2$. The ellipse passes through the points (XS, YS), $(XS - \frac{n_1}{2}, YS - \frac{n_2}{2})$, $(XS - n_1, YS)$ and $(X - \frac{n_1}{2}, YS + \frac{n_2}{2})$ at its axis extremities. The global variable param determines which point on the ellipse is generated. The last input element has as value a function (which is bound to the global variable finc) and is used to increment param. The first four variables are bound to the atoms A, B, Xshift and Yshift respectively. See Genpoint.

Erase (Fexpr)
Region Subrs

(Erase A_1 A_2 . . . A_n). Removes all named arrays from Dislist and thus from the scope.

Finc

A global variable used in curve generation. See ellipse, line, genpoint.

Genpoint (Expr)
Gen Stuff

(Genpoint) Evaluates the expressions bound to X and Y and delivers the CONS'ED result as the current point on a desired curve. It is assumed that X, Y have had expressions bound to them intended to generate points. See ellipse, line. Also, it is assumed i) that param is used in the point generating expressions to determine which point to produce, and ii) that a function has been bound to finc which increments the parameter as one wishes. Generate, then, after generating the current point, applies finc to param in preparation for the next point.

Hashpt (Expr)
Region Subrs

(Hashpt P) where P = (X · Y), inserts the number Y into the list pointed to by the element which corresponds to X in the array Hashtab.

Hashtab (Array)
Region Subrs

Names a one dimensional array (or array name) used to store points of a two dimensional grid. The one dimension corresponds to the first (left, Car) side of a point. The array is as long as necessary to accomodate all possible horizontal values between selected limits (see lowpt and uppt). Each entry in the array points to a list of second coordinate values.

Hist (Expr)
Region Subrs

(Hist F_n P_1 P_2 L) where P_1 and P_2 are points, L and F_n are a function of a single point, e.g., (F_n P) is an intensity. Using P_1 and P_2 as Lowpt and Uppt, Hist adds to L a list of ordered pairs. The first element of each is a value of F_n; the second is the number of times that value occurred.

I

A global name often used as an array index.

Iterate (Fexpr)
Gen Stuff

(Iterate $(a_1\ S_1)(a_2\ S_2)\ .\ .\ .)(a_n\ S_n)$)
where one of the a_i's is body and another is terminate. Iterate first binds the values of the S_i to the a_i. Then it evaluates body until the evaluation of terminate is T, at which point it returns result. (Result is nil unless set otherwise).

Lengthc (Expr)
Region Subrs

(Lengthc L) where L is a circular list, returns the length of L.

Line (Fexpr)
Gen Stuff

(Line n_1 n_2 p s f) Line sets up global variables with which generate generates a line. The variables (n_1, n_2) are a point through which the line passes when param is zero. The variable p is bound to param; s is the slope of the line; f is bound to finc.

Lineprint
Region Subrs

(Lineprint) prints on line printer
i) (Lowpt Uppt Den) on one line
ii) The array determined by Lowpt Uppt Den in lines.

Lowpt

A global variable point whose coordinates are used as lower bounds. Lowpt and Uppt define a rectangle in the vidisector's range. Lowpt defines the lower left corner and uppt the upper right.

Lowpt (Fexpr)
Region Subr

(Lowpt X Y). Lowpt set to (X · Y).

Memhash (Expr)
Region Subrs

(Memhash P) where P = (X · Y) yields:
i) T if the point is in Hashtab;
ii) Nil if not.

Model

A model is an atom which has on its property list, under "regions," a list of lists. Each one of these is of the form:
an atom followed by a list of properties and pointers. For example, to define a pyramid with two of its sides visible:

```
(Defprop Pyramid(
(A (Neighbor B)(Shape Triangle))
(B (Neighbor A)(Shape Triangle))) Regions)
```

NZP (Expr)
Region Subrs

```
(NZP P)
(Not (Zerop (Space (Car P)(Cdr P))))
```

Object

A global name often used as an array name's name.

Param

A global variable used in curve generation. See ellipse, line, genpoint.

Param2 (Expr)
Region Subrs

(Param2 Mode Light Pen Stop Scale Intensity) generates (and stores in the array Object) a display word intended to be interpreted in the parameter mode. The arguments mean what they seem to mean. (See page 63 of PDP-6 Manual.) Param2 uses and increments I as index for the array.

Point

Coordinate points normally used to refer to the two dimensional vidisector are assumed to be dotted pairs. The horizontal coordinate comes first ($\dot{X} \cdot Y$).

Point2 (Expr)
Region Subrs

(Point2 Axis Mode Light Pen Intensity Position) is to point mode as Param2 is to parameter mode.

Polyseg (Expr)
Poly Grfth

(Polyseg L) where L is a list of points which is a boundary. Polyseg returns a list of points which is a polygonal approximation to the boundary (except that the points in the output are a factor of 4 times larger than those in the input).

Pred

A global variable which is intended to reference a predicate of a single point.

Predicate (Fexpr)
Region Subrs

(Predicate P) sets Pred to P.

Pt

A global variable used as a point.

Pt (Fexpr)
Region Subrs

(Pt X Y). Sets Pt to (X · Y).

Raster (Fexpr)
Region Subrs

(Raster A) Approximately equivalent to:
(Setq A(List Den (Scan Pred (Scale Lowpt)
(Scale Uppt)))).

Reclaim (Fexpr)
Region Subrs

(Reclaim A) resets BPORG to just prior to the Array A.

Region (Expr)
Region Subrs

(Region P_1 Pred P_2 P_3) where the P_i are points and Pred is a predicate, yields a list L = (N B_1 B_2 . . . B_j) where N is the number of points found in the region and each B_i is a list of points which form one boundary of the region, R, defined:
i) R contains P_1; ii) All points in R are connected to P_1; iii) All points in R satisfy the predicate Pred; iv) All points in R are

within the bounds P_2 and P_3 considered as lowpt and uppt.

Region — A connected set of points all of which satisfy some particular predicate.

Region — A region is an atom which has on its property list the properties "Neighbors" and "Shape".

Corresponding to "Neighbors" is a list of atoms which are neighboring regions of the given atom. Corresponding to "Shape" is a shape name.

Remhash (Expr) Region Subrs — (Remhash P) where P = (X · Y), removes all references to that point from Hashtab.

Scale (Expr) Region Subrs — (Scale P) where P = (X · Y) is a point (used for vidisector referencing). Yields P' = (X/Den · Y/Den).

Scan (Expr) Region Subr — (Scan P_r P_1 P_2) where P_r is a predicate and P_i are points. Yields a list of points satisfying the predicate and within the rectangle defined by P_1 and P_2 as Lowpt and Uppt respectively.

Scene — A scene is an atom which has on its property list, under "regions" a list of atoms corresponding to regions in the scene.

Sclear (Fexpr) Region Subrs — (Sclear). (Setq Dislist Nil).

Sets (Expr) Gen Stuff — (Sets L) were L is $((a_1\ S_1)\ (a_i\ S_2)\ \ldots\ (a_n\ S_n))$ For each i, binds the value of the S-expression S_i to the atom a_i.

Setq (Fexpr)
Gen Stuff

(Setq $(a_1\ S_1)(a_2\ S_2)\quad (a_n\ S_n)$)

For each i, binds the value of the S-expression S_i to the atom a_i.

Shape (Expr)
Region Subrs

(Shape $L_1\ L_2$ N) where $L_1 = ((R_1\ L_{11})(R_2\ L_{12}) \ldots (R_n\ L_{1n}))$

$L_2 = (B_1\ B_2 . . , B_n)$

R_i is a topology-coded descriptive name of a region; L_{1i} is a list of neighbors of R_i

B_i is a description of the boundary R_i suitable for input to Curve. Shape builds a description of this scene suitable for DT and stores the region list under (Eval N), which must be an atom.

Sin (Expr)
Gen Stuff

(Sin X) Returns sin of X radians.

Terminate

A semi-global variable assumed by iterate to name an expression which is a predicate for a terminating condition.

Topology (Expr)
Topo System

(Topolog N) where N is the number of squares in a line. Topolog finds regions and generates names for them. It also notes relationships between them. To Regionlist, Topolog binds the list of regions. To each region, Topolog binds the properties: Nucleus, followed by a list of points found; Neighbors, followed by a list of neighboring regions; Outerbound, followed by a list of points; Innerbound, followed by a list of lists of points forming inner bounds.

Uppt — A global variable point whose coordinates are used as upper bounds. (See lowpt).

Uppt (Fexpr)
Region Subr — (Uppt X Y). Sets Uppt to (X · Y).

X
X shift
Y
Y shift — Global variables used to generate ellipses and lines.