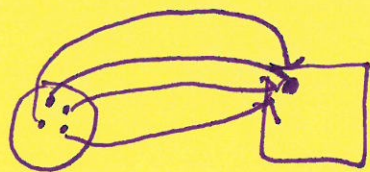


Competing goals for  $\phi$ :

Bijective:

injective (1-1): each point from texture comes from one point on model

surjective (onto): each point in texture is target from the model



Size distortion: size of texture approx const across surface

(intuit) points on the surface that are ~~close~~ dist  $d$   
 they map to tex coords that have about dist  $d$  (scaled)

(math) mag of deriv of  $\phi$  should not change too much



Nov 2

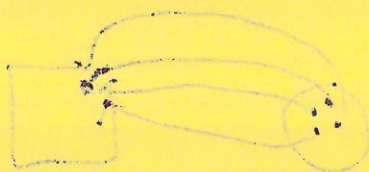
Texting (11.2)

Composing goals for  $\phi$

Bijective:

injective (1-1): each point from texture comes from one point on model

surjective (onto): each point in texture is covered from the model



size of texture affects const  
across surfaces

(independent of the surface that are dist of

that map to tex coords that have short distances

(and) map to short of  $\phi$  should not change to much



Shape distortion! not too distorted

(intuit) circles on surface of shape  
should map to ~~neighborhood~~  
approx circles in texture

(math) directional deriv doesn't change too much  
in diff directions

Continuity! no too many "seams"

(intuit) neighborhood of points on shape  
map to neighborhood of points in texture

(math)  $\phi$  is continuous



shape distortion: not too distorted

spots of surface of skin (faint)

should not be registered

order circles in texture

shape of spots + shape of texture (faint)

in diff. directions

"same" from all directions

spots no delay to backside (faint)

order in shape of backside of spots in texture

examination of (faint)



Eg w/ sphere

$$f: [0,1]^2 \rightarrow [0,\pi] \times [0,2\pi]$$

$$(u,v) \mapsto (\pi u, 2\pi v)$$

$$g: [0,\pi] \times [0,2\pi] \rightarrow S^2$$

$$(\alpha, \beta) \mapsto (\cos(\alpha)\sin(\beta), \sin(\alpha)\sin(\beta), \cos(\beta))$$

$$g \circ f: T \rightarrow S^2$$

$$\phi = (g \circ f)^{-1}$$

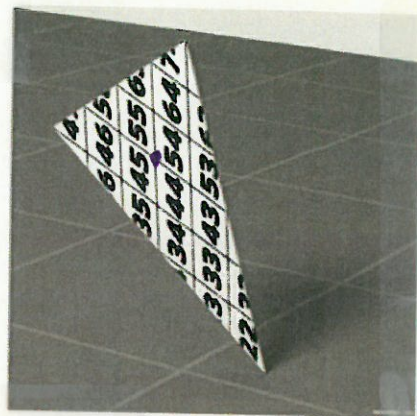
$$\phi(x,y,z) = \left( \left[ \pi + \arctan(y,x) \right] / 2\pi, \left[ \pi - \arccos\left(\frac{z}{|x|}\right) \right] / \pi \right)$$



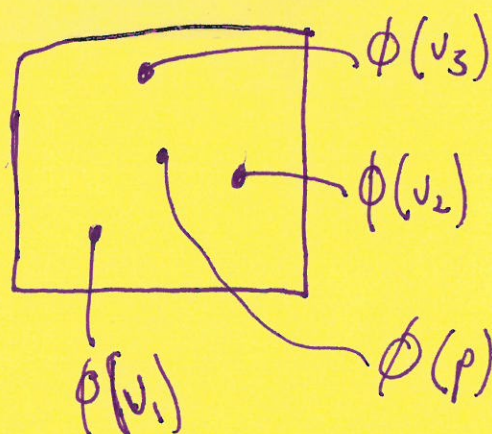
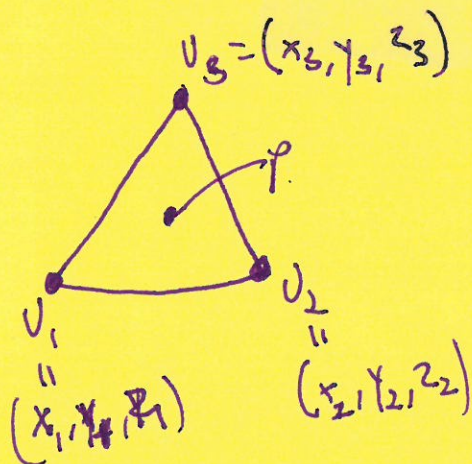




09	19	29	39	49	59	69	79	89	99
08	18	28	38	48	58	68	78	88	98
07	17	27	37	47	57	67	77	87	97
06	16	26	36	46	56	66	76	86	96
05	15	25	35	45	55	65	75	85	95
04	14	24	34	44	54	64	74	84	94
03	13	23	33	43	53	63	73	83	93
02	12	22	32	42	52	62	72	82	92
01	11	21	31	41	51	61	71	81	91
00	10	20	30	40	50	60	70	80	90



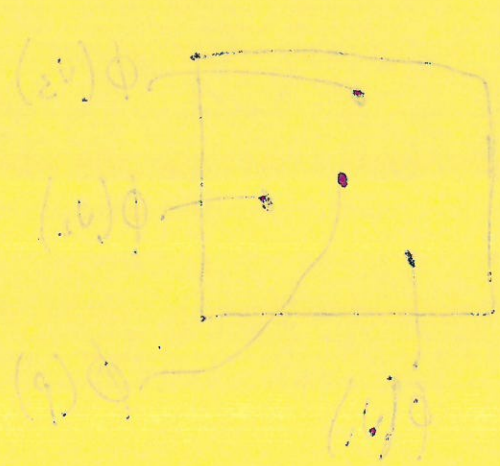
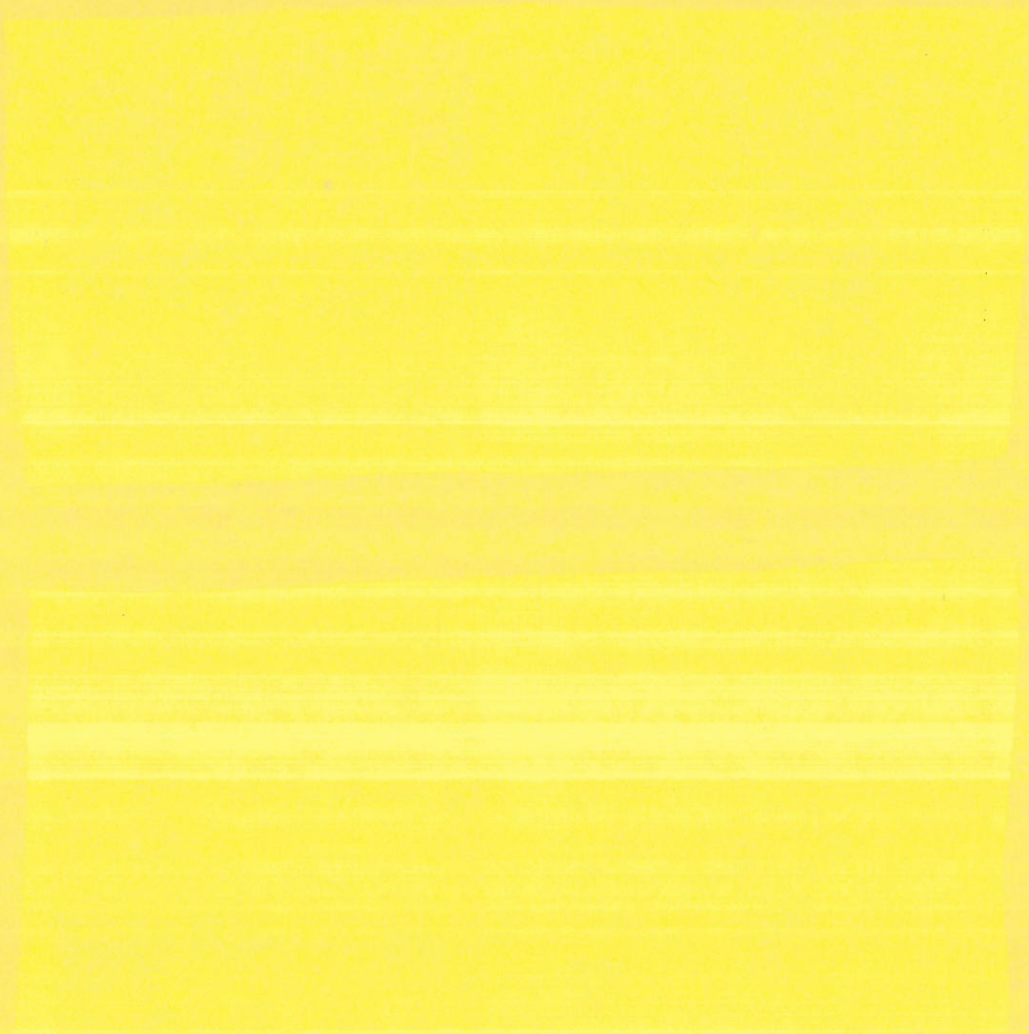
09	19	29	39	49	59	69	79	89	99
08	18	28	38	48	58	68	78	88	98
07	17	27	37	47	57	67	77	87	97
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01	11	21	31	41	51	61	71	81	91
00	10	20	30	40	50	60	70	80	90



Barycentric Interpolation

$$b = \text{as\_barycentric}(v_1, v_2, v_3, p)$$





(1, 2, 3, 4) is a set of 4 elements  
 (1, 2, 3, 4) is a set of 4 elements  
 (1, 2, 3, 4) is a set of 4 elements



$$b = \text{as\_barycentric}(v_1, v_2, v_3, p)$$

$$(u_1, v_1) = \text{as\_tex}(v_1)$$

$$(u_2, v_2) = \text{as\_tex}(v_2)$$

$$(u_3, v_3) = \text{as\_tex}(v_3)$$

$$\begin{bmatrix} u_p \\ v_p \end{bmatrix} = b.\text{alpha} \begin{bmatrix} u_1 \\ v_1 \end{bmatrix} + b.\text{beta} \begin{bmatrix} u_2 \\ v_2 \end{bmatrix} + b.\text{gamma} \begin{bmatrix} u_3 \\ v_3 \end{bmatrix}$$



$$(1, 2v, 2v, v) \text{ at } (0, 0, 0) = 0$$

$$(1, v) \text{ at } 20 = (2v, v)$$

$$(2v) \text{ at } 20 = (2v, 2v)$$

$$(2v) \text{ at } 20 = (2v, 2v)$$

$$\begin{bmatrix} 2v \\ 2v \end{bmatrix} \text{ at } 20 + \begin{bmatrix} 2v \\ 2v \end{bmatrix} \text{ at } 20 + \begin{bmatrix} 2v \\ 2v \end{bmatrix} \text{ at } 20 = \begin{bmatrix} 2v \\ 2v \end{bmatrix}$$