Graphical Models Coursework 2

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Contributions

$$T_{local}(x,y,z) = \sum_{l=0}^{3}\sum_{m=0}^{3}\sum_{n=0}^{3} B_l(u)B_m(v)B_n(w)\phi_{i+l,j+m,k+n} \tag{1}$$

$$B_0(u) = (1-u)^3/6$$
$$B_1(u) = (3u^3 - 6u^2 + 4)/6$$
$$B_2(u) = (-3u^3 + 3u^2 + 3u + 1)/6$$
$$B_3(u) = u^3/6$$

$$T_{local}(x,y,z) = \sum_{l=1}^{L} T_{local}^{l}(x,y,z)$$

$$C_{smooth} = \frac{1}{V}\int_0^X \int_0^Y \int_0^Z \left[\left(\frac{\partial^2 T}{\partial x^2}\right)^2 + \left(\frac{\partial^2 T}{\partial y^2}\right)^2 + \left(\frac{\partial^2 T}{\partial z^2}\right)^2 + 2\left(\frac{\partial^2 T}{\partial xy}\right)^2 + 2\left(\frac{\partial^2 T}{\partial xz}\right)^2 + 2\left(\frac{\partial^2 T}{\partial yz}\right)^2\right] dx\, dy\, dz$$

$$C_{similarity}(A,B) = \frac{H(A) + H(B)}{H(A,B)}$$

$$C(\Theta,\Phi) = -C_{similarity}(I(t_0), T(I(t))) + \lambda C_{smooth}(T)$$

$$T(x,y,z) = T_{global}(x,y,z) + T_{local}(x,y,z)$$

$$T_{global}(x,y,z) = \begin{pmatrix}\theta_{11} & \theta_{12} & \theta_{13}\\ \theta_{21} & \theta_{22} & \theta_{23}\\ \theta_{31} & \theta_{32} & \theta_{33}\end{pmatrix}\begin{pmatrix}x\\ y\\ z\end{pmatrix} + \begin{pmatrix}\theta_{14}\\ \theta_{24}\\ \theta_{34}\end{pmatrix}$$

Registration		Ranking		
A	B	$A < B$	$A = B$	$A > B$
Rigid	No registration	78%	22%	-
Affine	No registration	84%	16%	-
Affine + FFD	No registration	94%	6%	-
Affine	Rigid	13%	78%	9%
Affine + FFD	Rigid	94%	6%	-
Affine + FFD	Affine	94%	6%	-