Non-rigid Structure from Motion:
Inferring the camera motion and shape of non-rigid objects + additional constraints (e.g., temporal order.)

Structure from Category:
Inferring the camera motion and shape of objects in the same object category (aeroplanes, chairs, buses, and etc.)

Assume the 3D shape of instance $f$, $S_f$ can be well-approximated as a linear combination of a set of rotated 3D bases $\{B_l\}_{l=1}^L$:

$$S_f = \sum_{l=1}^L c_l R_f B_l \leftrightarrow \begin{bmatrix} W_1 \\ \vdots \\ W_F \end{bmatrix} = \begin{bmatrix} KS_1 \\ \vdots \\ KS_F \end{bmatrix} + \begin{bmatrix} T_1 \\ \vdots \\ T_F \end{bmatrix} = \begin{bmatrix} c_{11}KR_{11} & \cdots & c_{1K}KR_{1K} \end{bmatrix} \begin{bmatrix} B_1 \\ \vdots \\ B_L \end{bmatrix} + \begin{bmatrix} T_1 \\ \vdots \\ T_F \end{bmatrix}$$

To estimate the 3D shape, we minimize the re-projection error:

$$\min_{M,B,T} \frac{1}{2} \left\| R \odot (MB + T) - W \right\|_F^2 + \lambda \|C\|_1$$

subject to:

$$M_fM_f^T = c_f^2 I, f = 1, \ldots, F, l = 1, \ldots, L,$$

$$\|B_l\|_F = 1, f = 1, \ldots, F,$$

which can be solved by ADMMs.