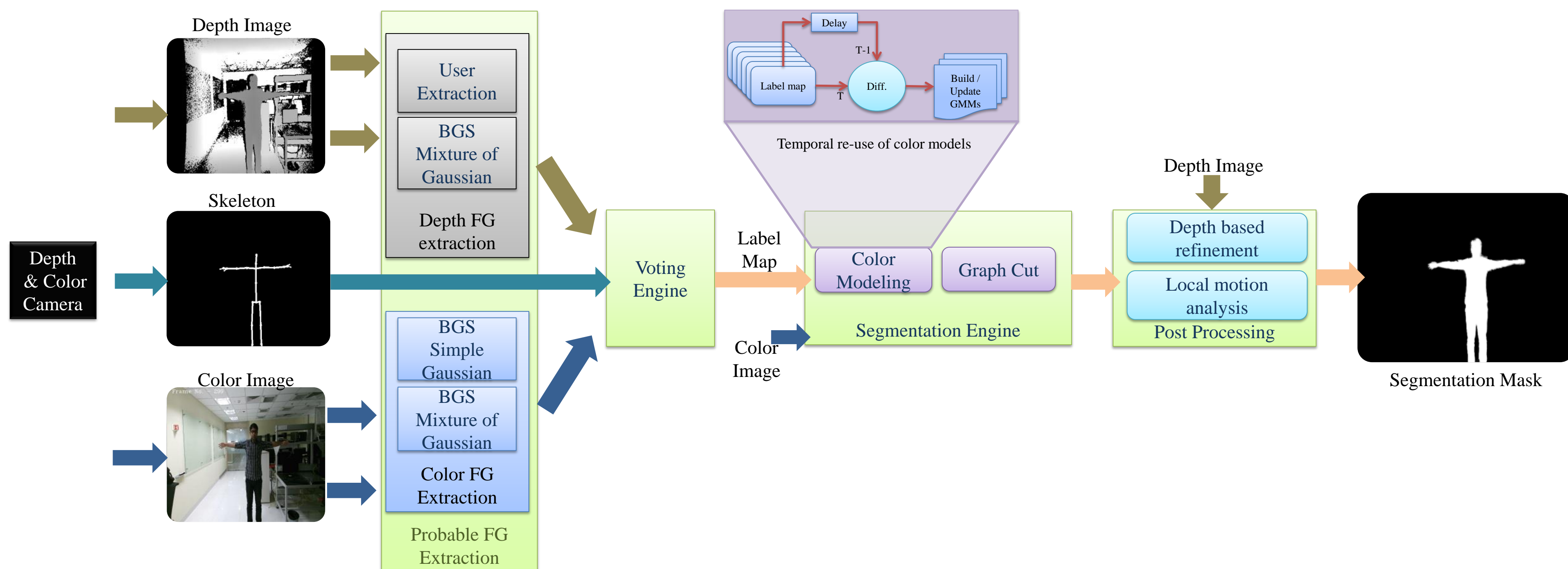


### Our framework : Three Stage Segmentation

- Probable foreground extraction - Two color based Two depth based.
- Multi-Hypothesis based Segmentation - Color modelling using FG – BG probabilities & Skeleton. Graph cut with temporal re-use of color models.
- Post processing – Depth modeling based refinement. Local motion based compensation.



System Diagram

$$Label = \begin{cases} \text{Definite FG}, & s = 4 \\ \text{Probable FG}, & s = 3 \\ \text{Unknown}, & s = 2 \\ \text{Probable BG}, & s = 1 \\ \text{Definite BG}, & s = 0 \end{cases}$$

$$s = \sum_{i=1}^4 Mask_i$$

Voting engine

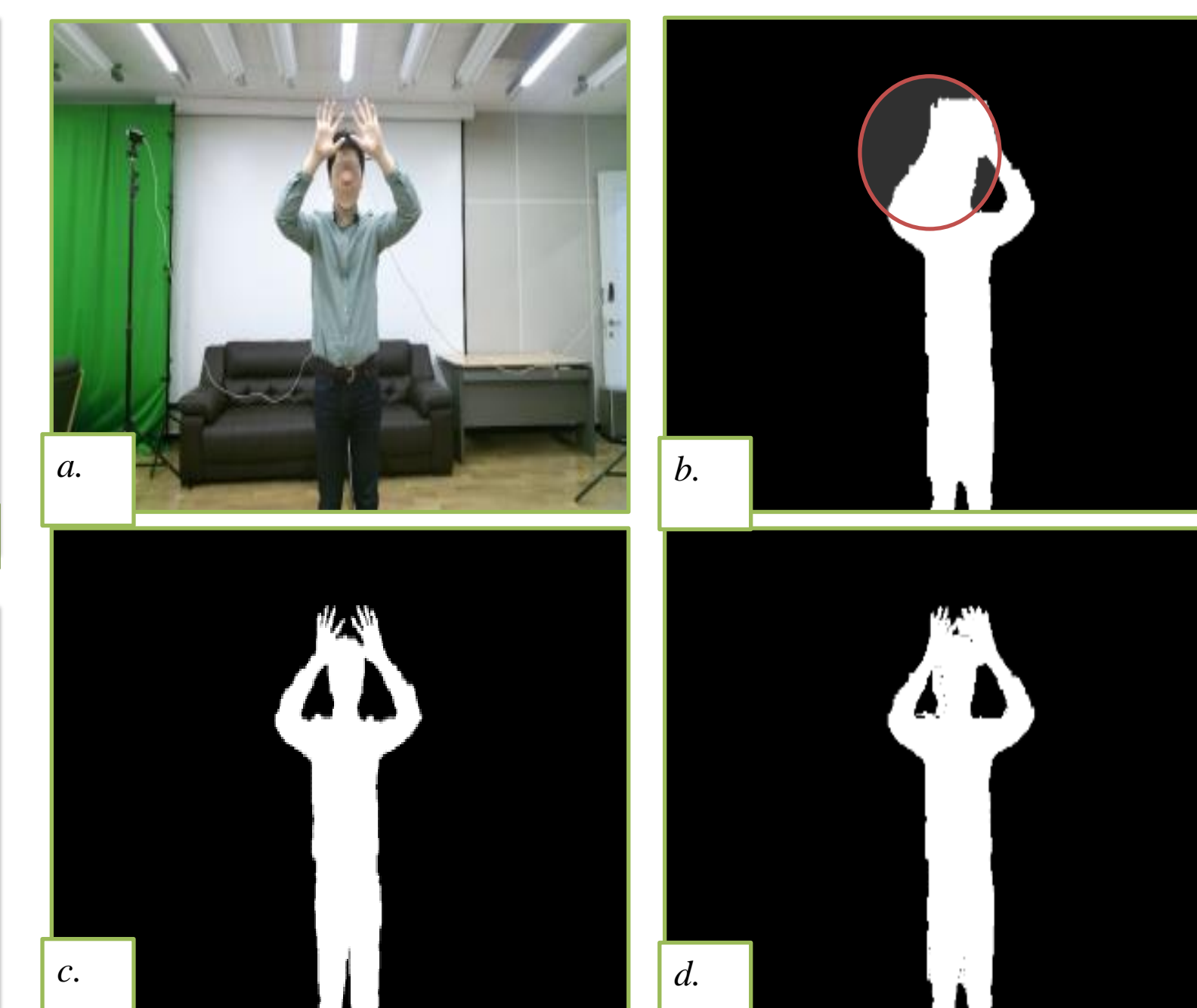
$$r = \frac{\Delta n}{n_F}$$

$$w_t = \begin{cases} \frac{1-w_0}{r_0} * r + w_0; & r \leq r_0 \\ 1; & r > r_0 \end{cases}$$

$$M_t = w_t * M_t + (1 - w_t) * M_{t-1}$$

$\Delta n$  is the pixels changed in current Mask  $M_t$  having  $n_F$  FG pixels.  
 $w_t$  is the update weight.

Local Motion Based Compensation

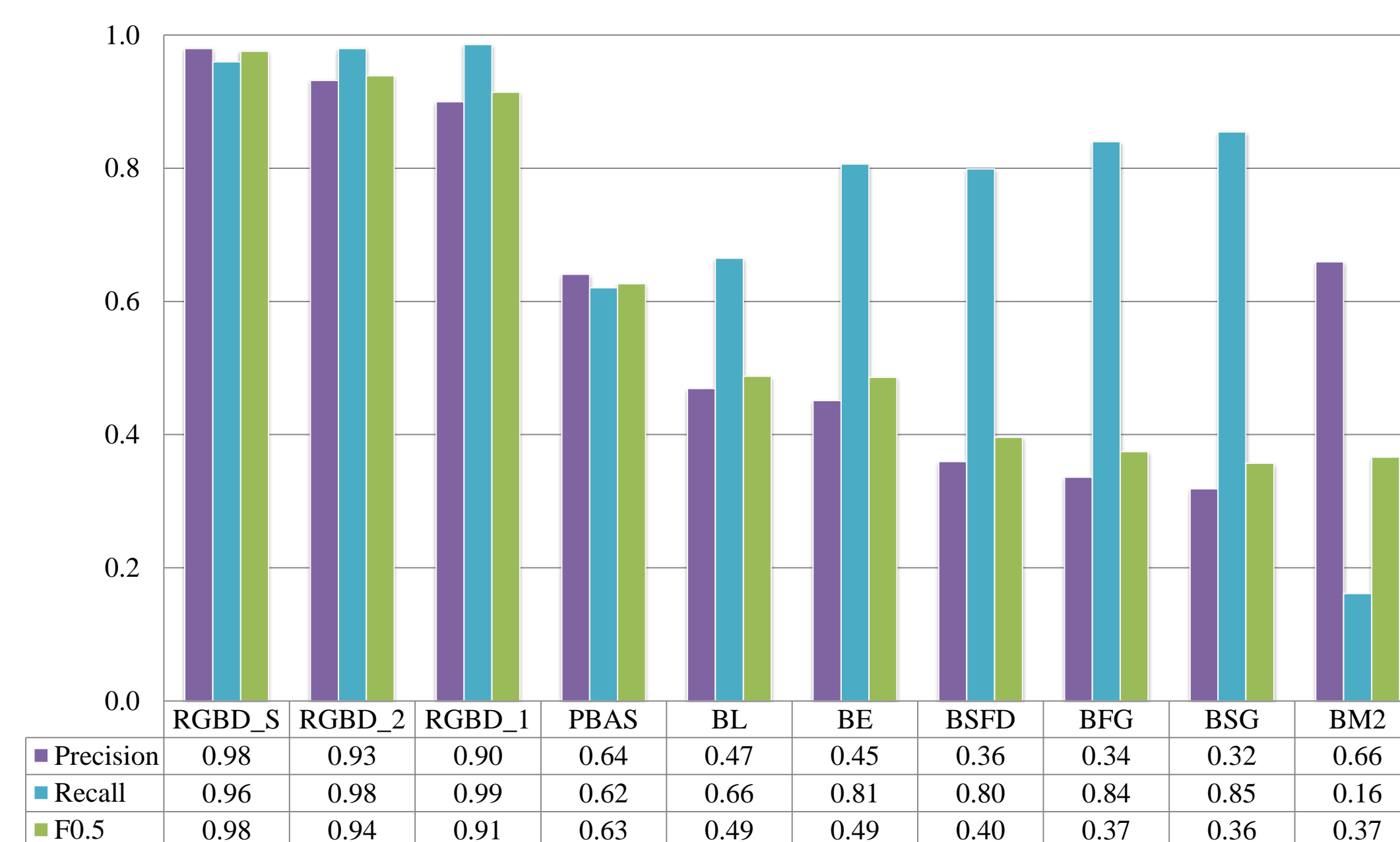


Depth based refinement - a. Color image, b. Multi-hypothesis based segmentation stage with error, c. Ground truth, d. Post processed result

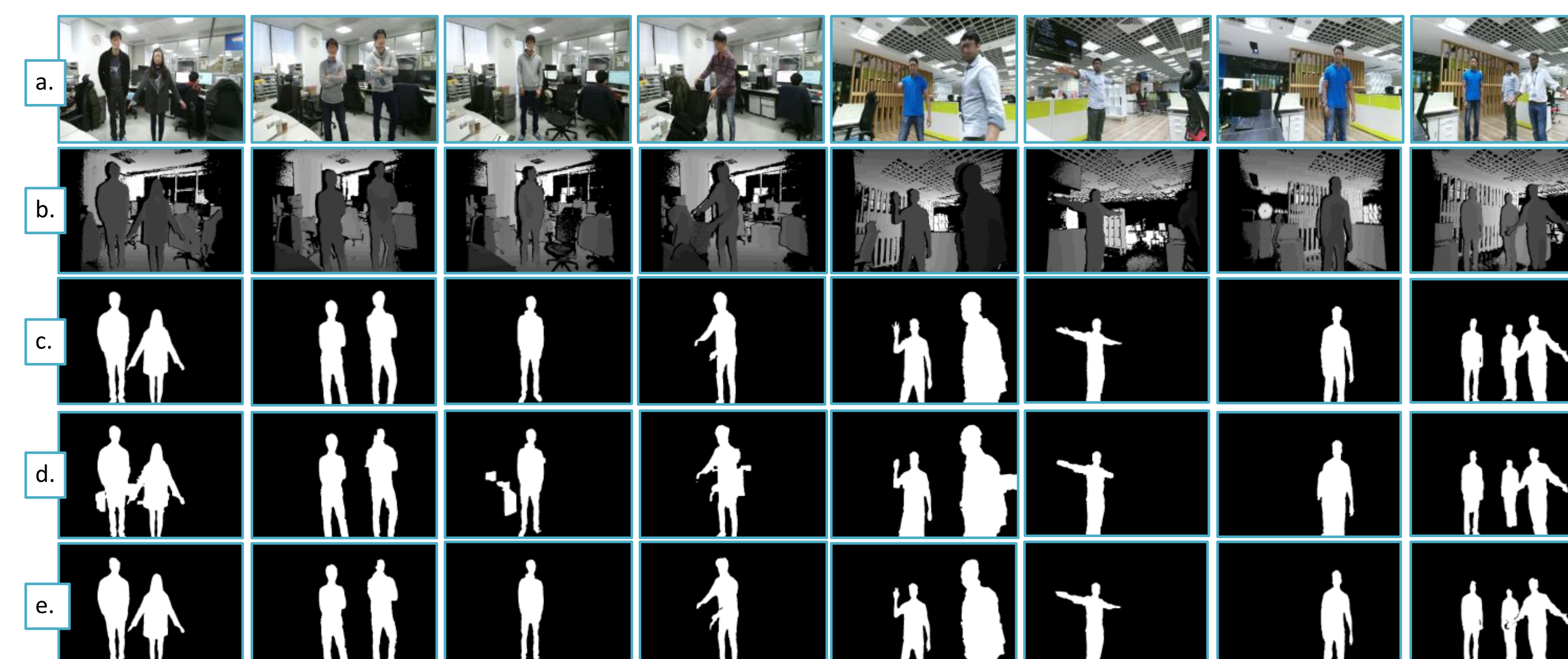
**Performance**

- Accuracy ( $F_{0.5}$ ) = 0.975
- Processing Time = 38 ms per frame
- Memory Usage = 150 MB
- CPU Utilization = 30%

\* Performance on 3.4 GHz Intel Core i7-4770 CPU for 640x480 Image



Results comparison



a. Color Image, b. Depth, c. Ground Truth, d. Depth and Color Fused (RGBD\_2) e. RGBD\_S(our method)