

IMAGE-BASED CLUSTERING OF MICROBIAL COLONIES

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OBJECTIVE

- achieve total laboratory automation
- mechanize the task of colony selection
- obtain precise segmentation and clustering masks

Figure 1

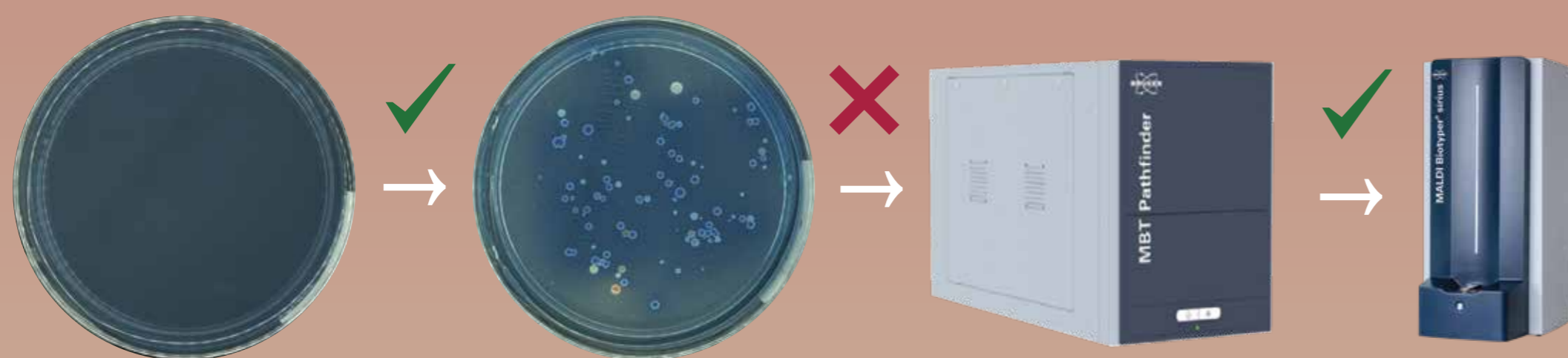


Figure 2

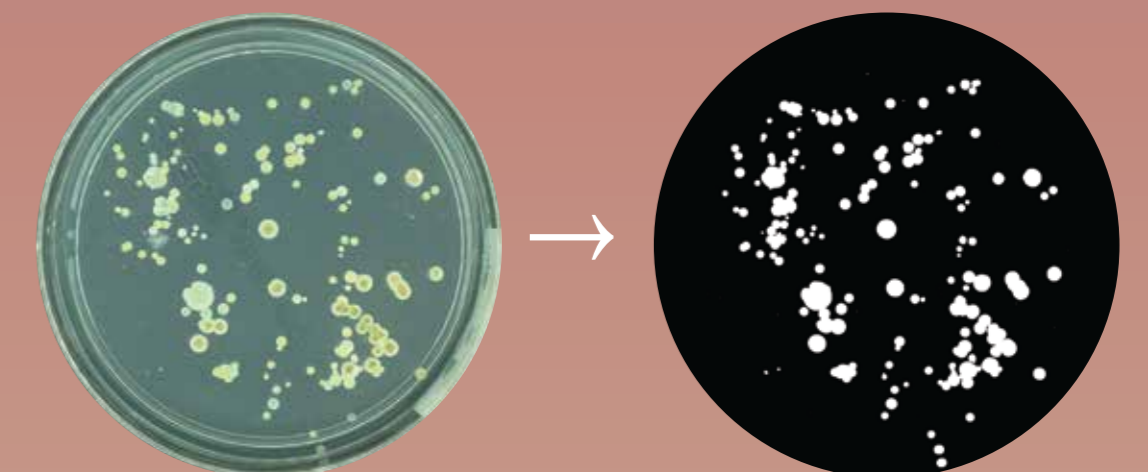
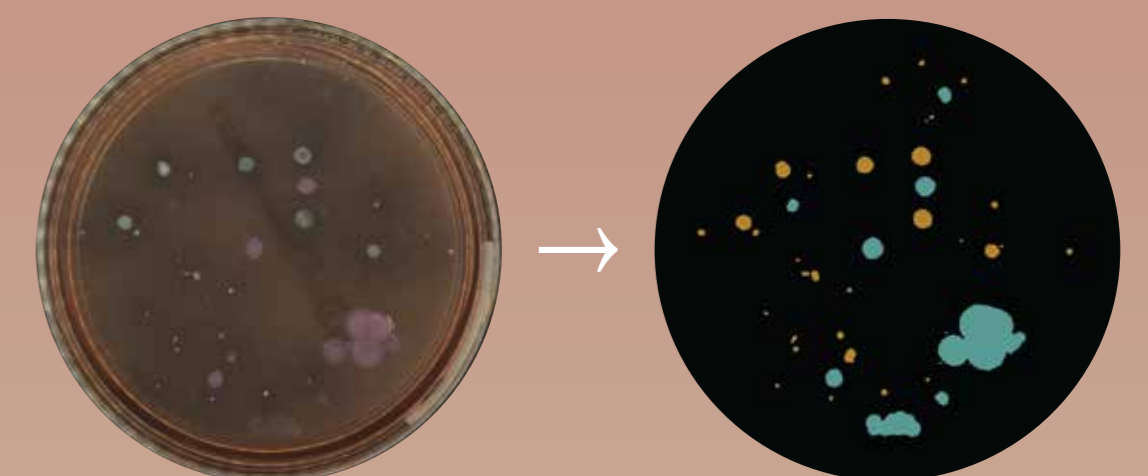


Figure 3



GENERATING ARTIFICIAL DATA

- repurpose the available labeled data
- gather isolated colony cutouts
- key out the surrounding agar
- place the cutouts upon empty dishes
- simulate agar reaction phenomena

Figure 4

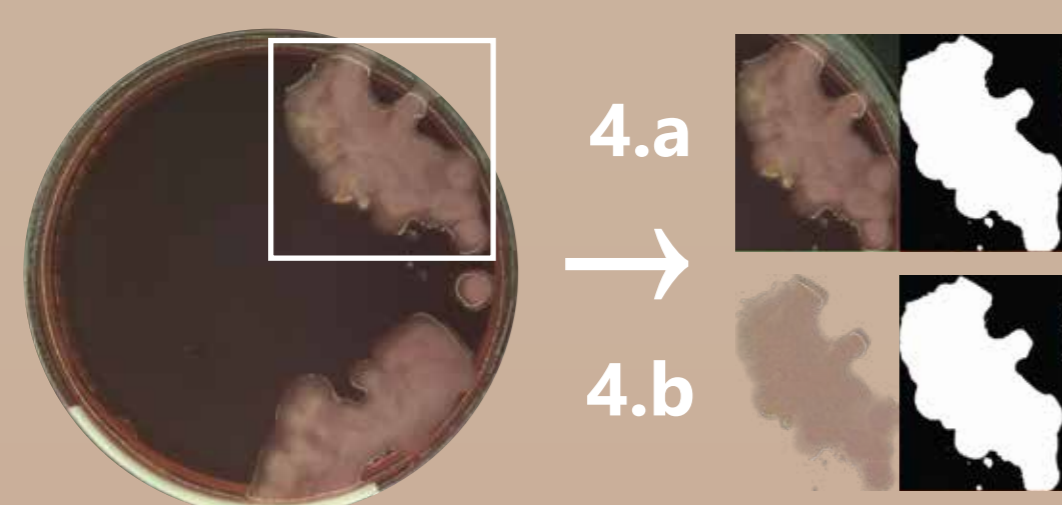
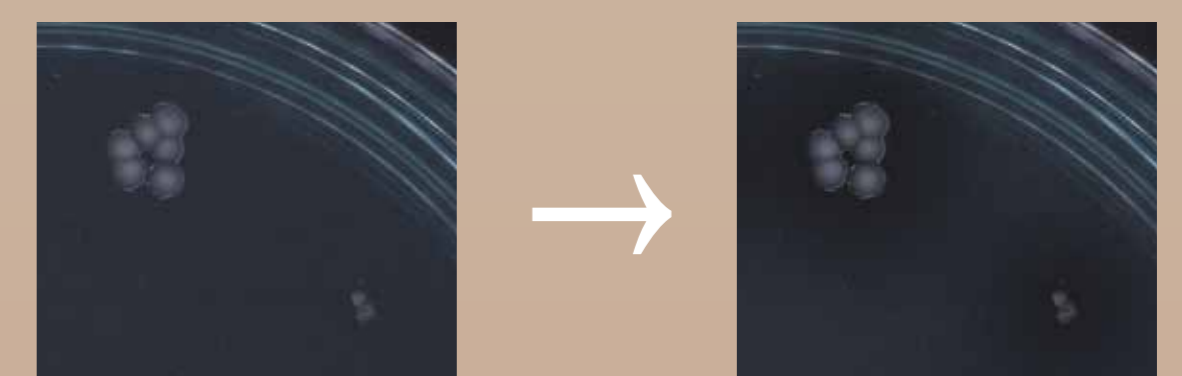


Figure 5



Figure 6



SEGMENTATION

Figure 7

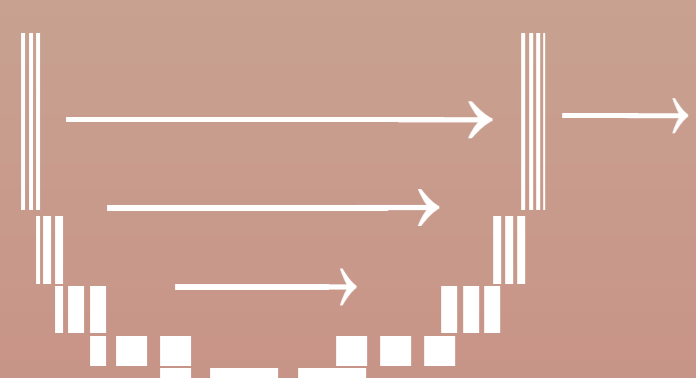


Figure 8

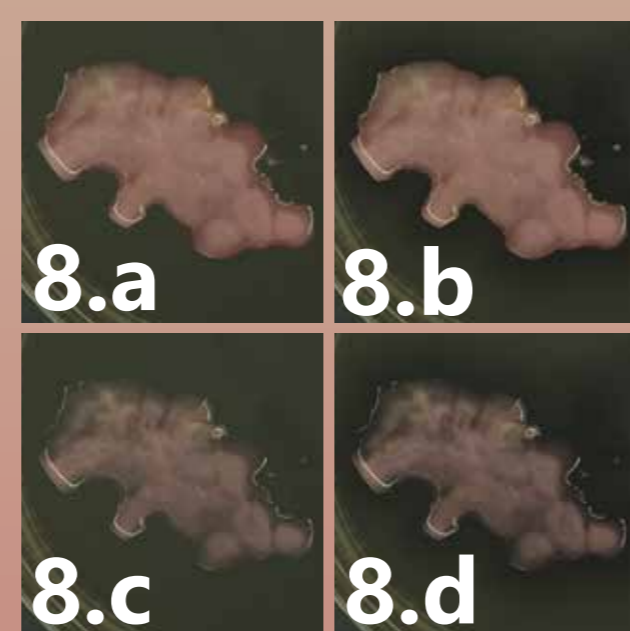


Table 1

	def.	8.a	8.b	8.c	8.d
F1	0.52	0.67	0.69	0.70	0.74

- U-Net segmentation
- 4 different datasets
- reliably test realism features separately

CLUSTERING

Figure 9



Figure 10



- cluster colonies on a dish
- using RGB values as features
- extracting features from a U-Net autoencoder
- manually extracting the features

Table 2

	RGB	U-Net	Man.
V-m.	0.87	0.91	0.91



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