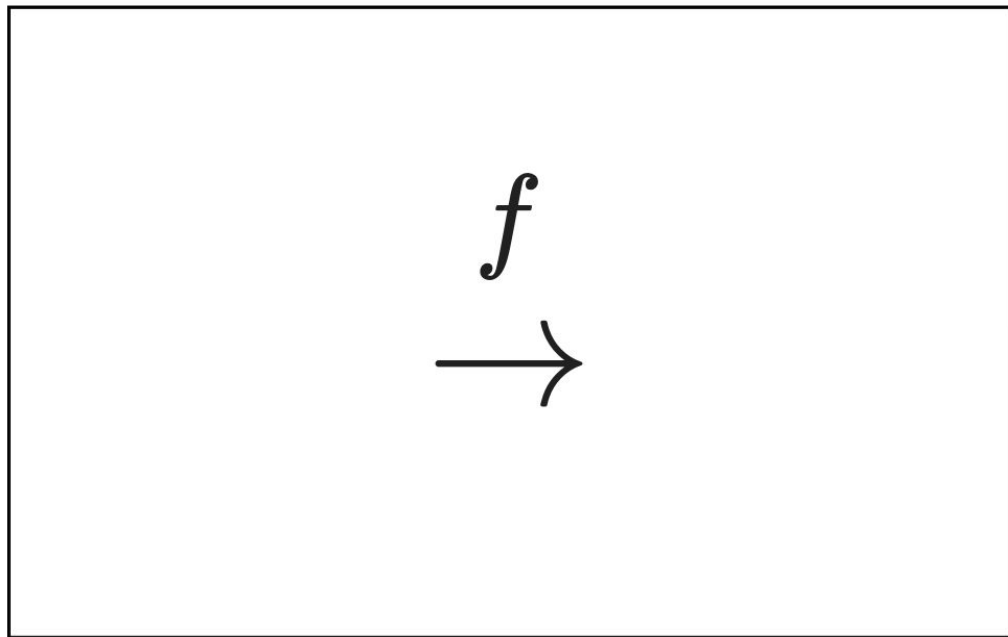


self supervised learning & making use of unlabelled data

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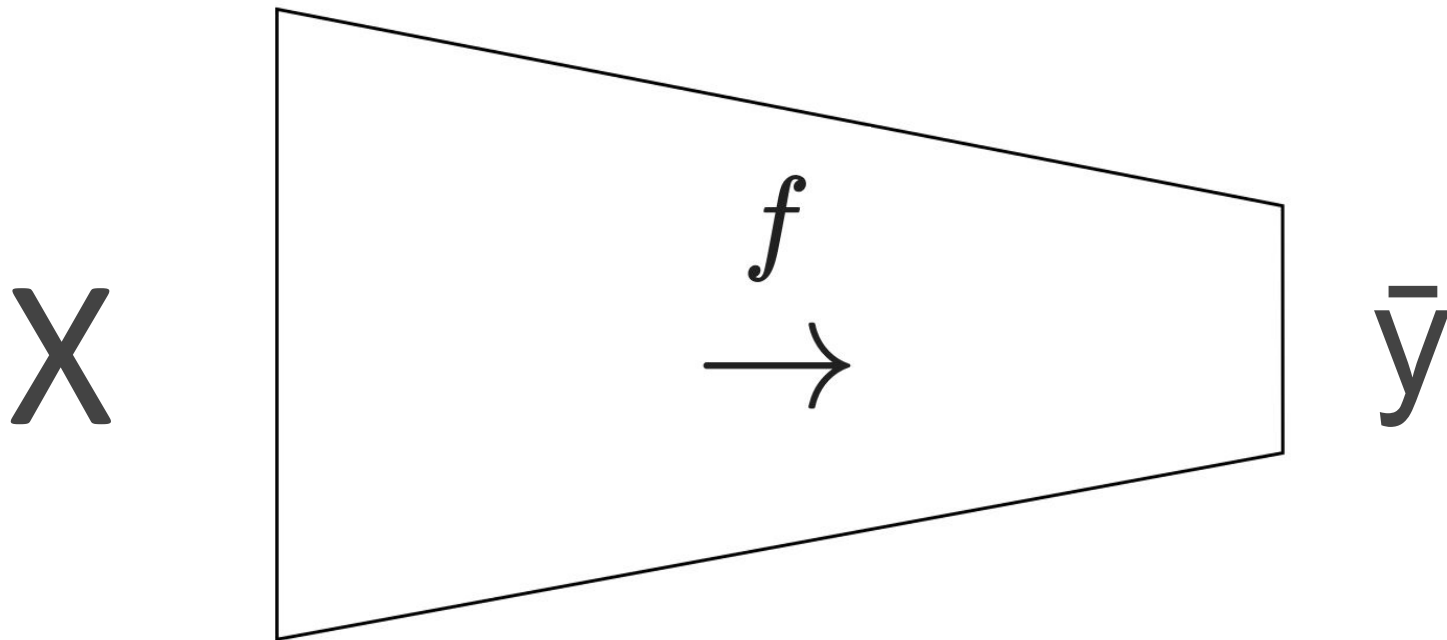
representation learning

X

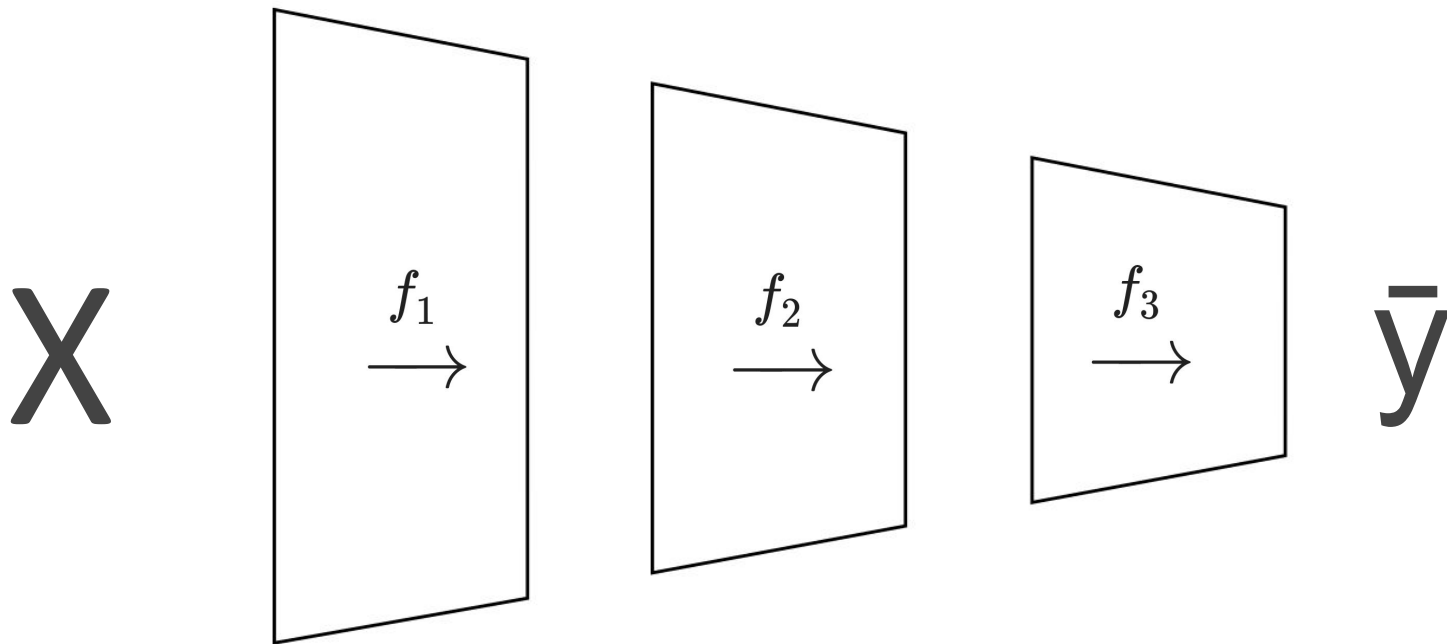


\bar{y}

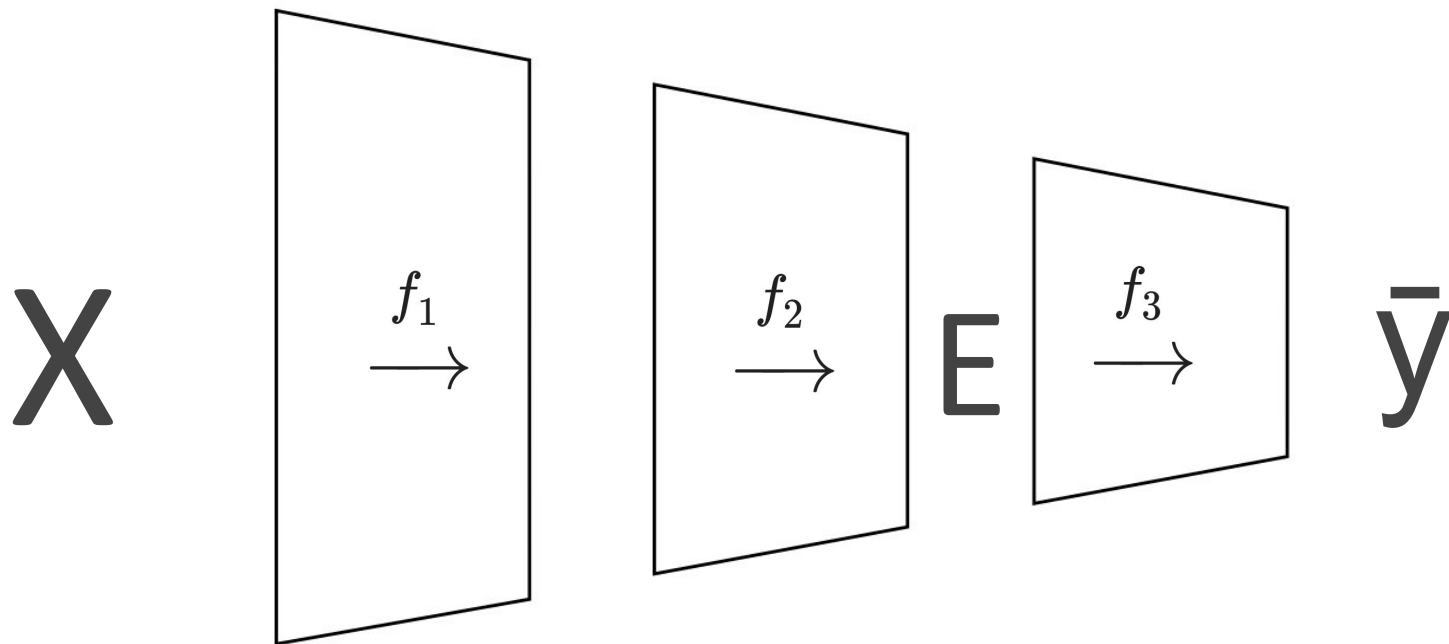
representation learning



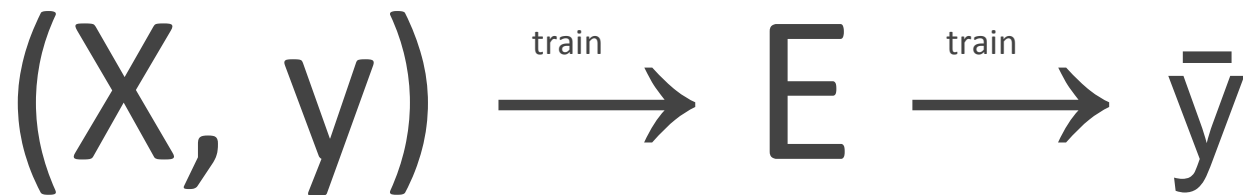
representation learning



representation learning

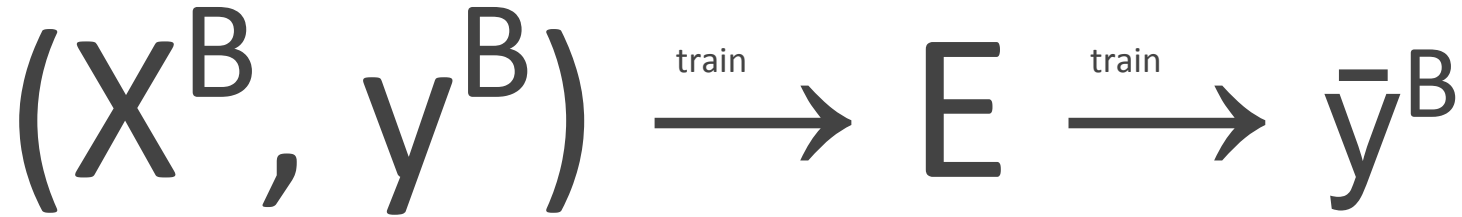


reusing representations

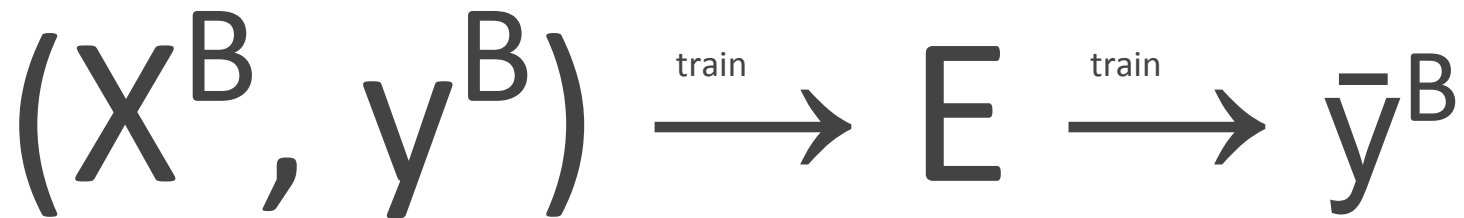


$$\text{Loss} = f(y, \bar{y})$$

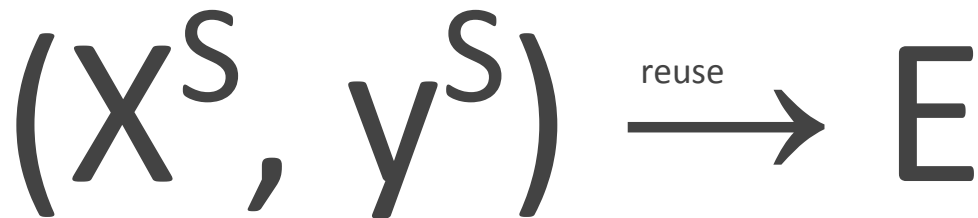
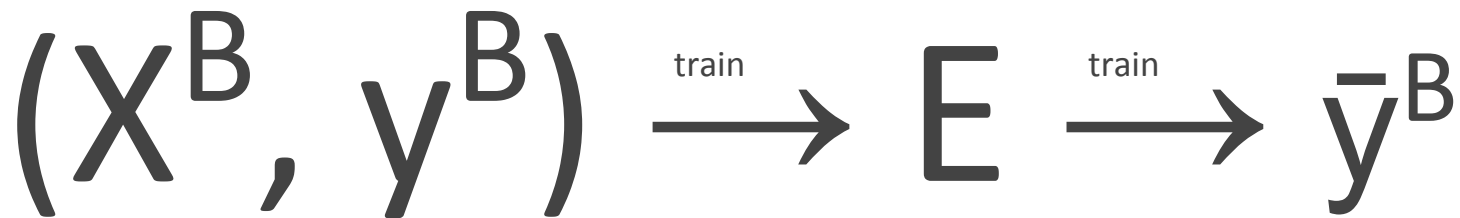
reusing representations (transfer learning)



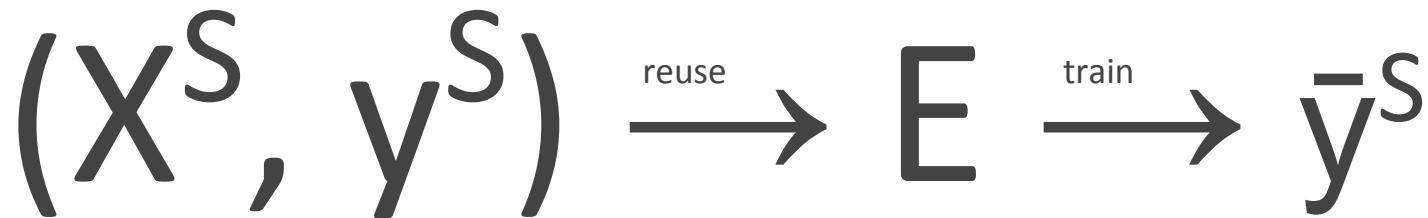
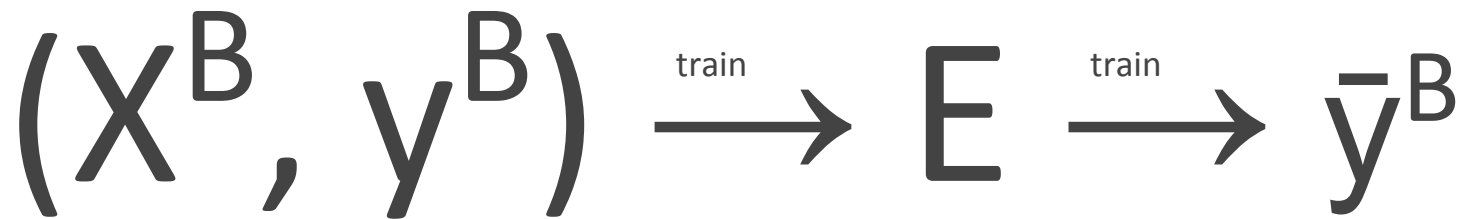
reusing representations (transfer learning)


$$(X^S, y^S)$$

reusing representations (transfer learning)



reusing representations (transfer learning)

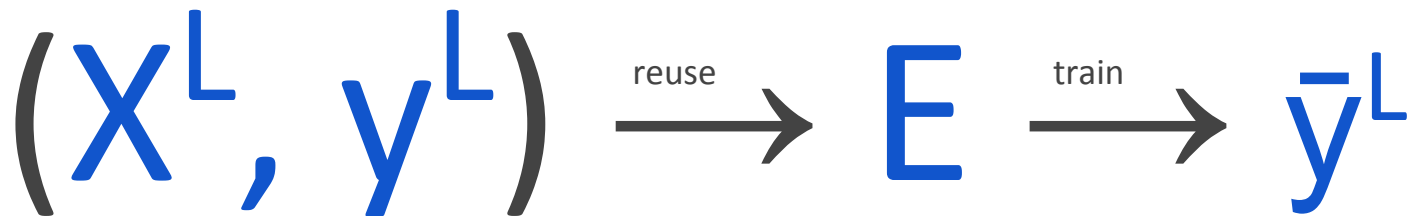
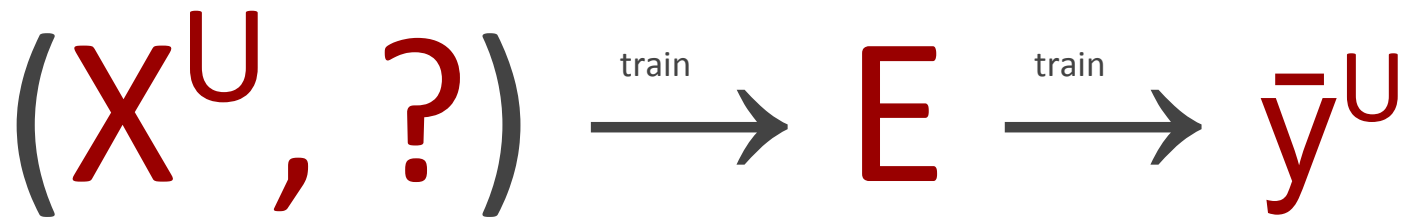


reusing representations

$(X^U, ?)$

(X^L, y^L)

reusing representations



<rant> self training </rant>

$(X^U, ?)$

$(X^L,$

$y^L)$

<rant> self training </rant>

$(X^U, ?)$

$(X^L,$

$y^L)$

$(X^L, y^L) \xrightarrow{\text{train}} \bar{y}^L$

<rant> self training </rant>

$(X^U, ?)$

$(X^L,$

$y^L)$

$(X^L, y^L) \xrightarrow{\text{train}} \bar{y}^L$
 $X^U \xrightarrow{\text{apply}} \bar{y}^U$

<rant> self training </rant>

$$(X^U, ?)$$

$$(X^L,$$

$$y^L)$$

$$(X^L, y^L) \xrightarrow{\text{train}} \bar{y}^L$$

$$X^U \xrightarrow{\text{apply}} \bar{y}^U$$

$$(X^L + X^U, y^L + \bar{y}^U) \xrightarrow{\text{train}} \bar{y}$$

self labelling from sequences

the cat sat on the _____?

self labelling from sequences

the cat sat on the mat by the window

self labelling from sequences

the cat sat on the mat by the window

X y

self labelling from sequences

the cat sat on the mat by the window

X y

self labelling from sequences

the cat sat on the mat by the window

X y

self labelling from sequences



self labelling by contrasting

$$(X_i, y_i) \longrightarrow E_i \longrightarrow \bar{y}_i$$

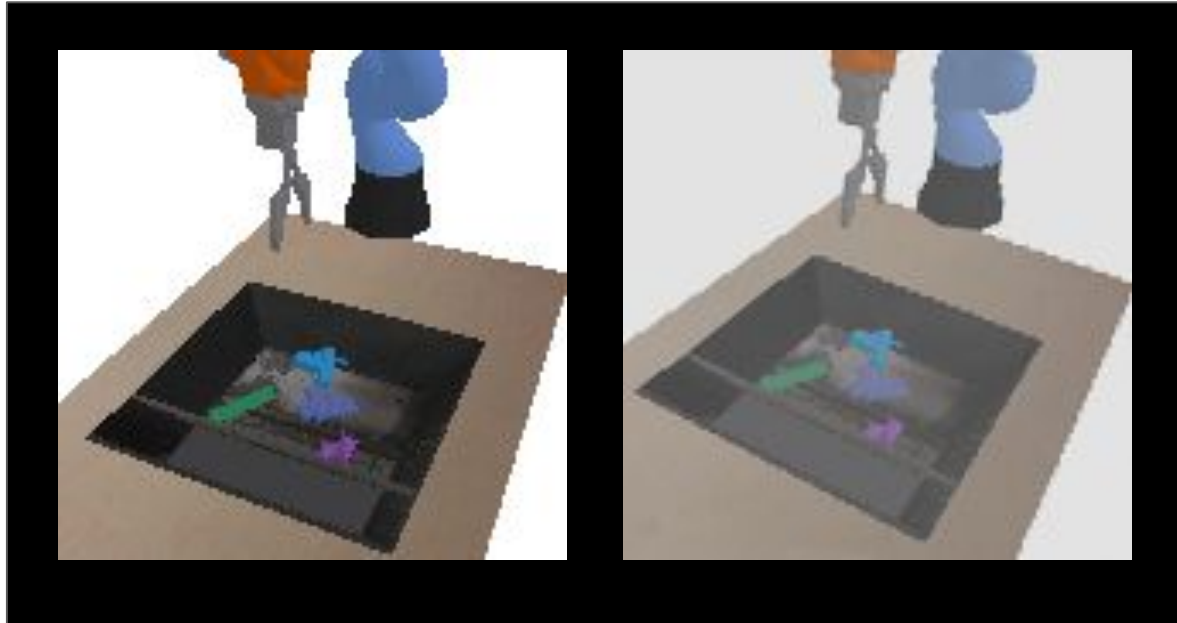
$$\text{Loss} = f(y_i, \bar{y}_i)$$

self labelling by contrasting

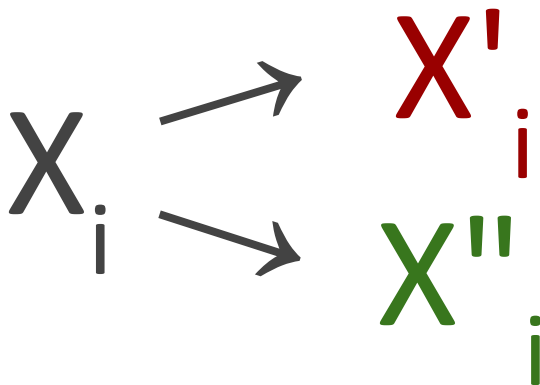
$$(X_i, y_i) \longrightarrow E_i \longrightarrow \bar{y}_i$$

$$(X_j, y_j) \longrightarrow E_j \longrightarrow \bar{y}_j$$

augmentation

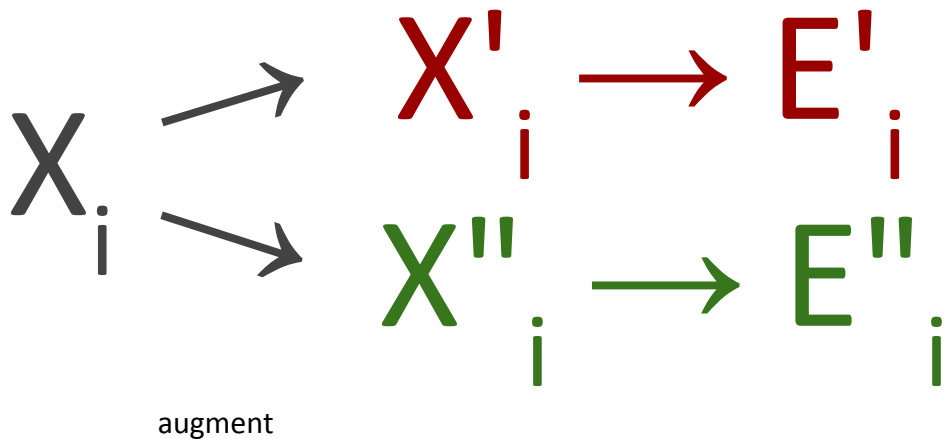


self labelling by contrasting



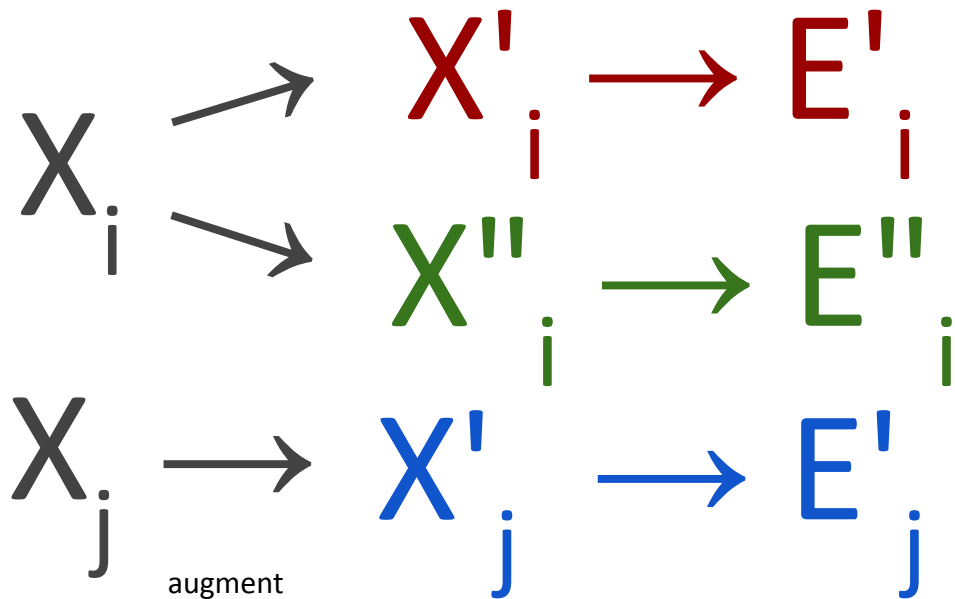
augment

self labelling by contrasting



Loss = minimise $\text{dist}(E'_i, E''_i)$

self labelling by contrasting

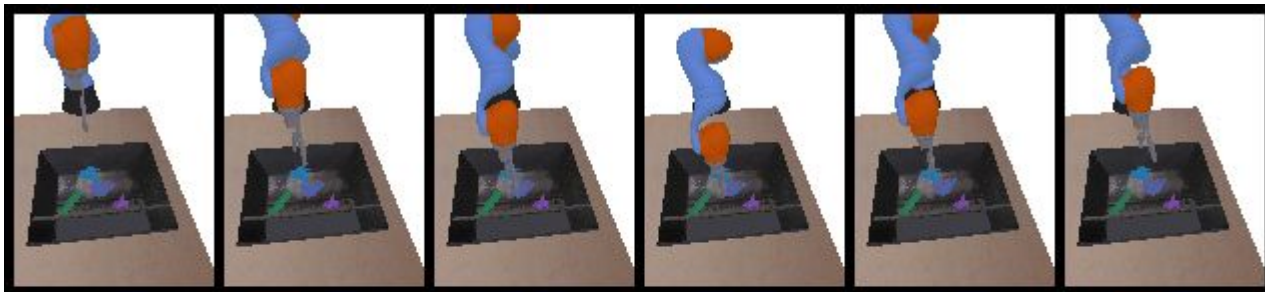


Loss = minimise $\text{dist}(E'_i, E''_i)$ & maximise $\text{dist}(E'_i, E'_j)$

augmentation

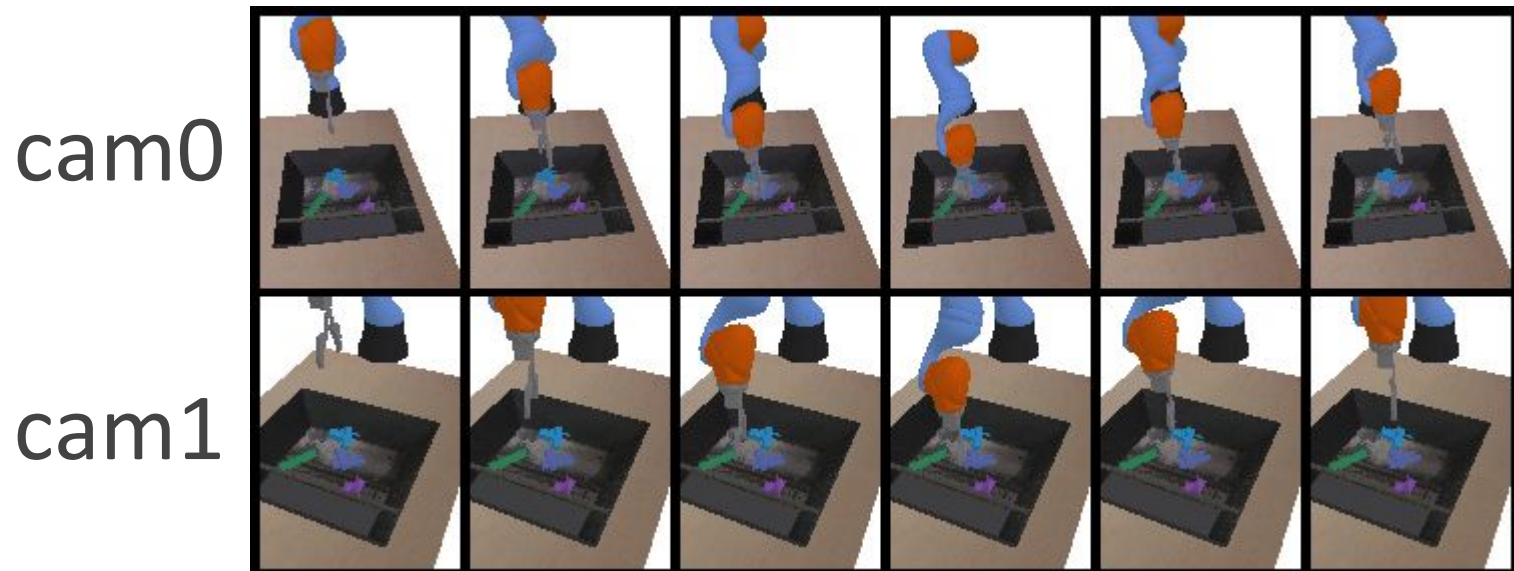


self labelling by contrasting



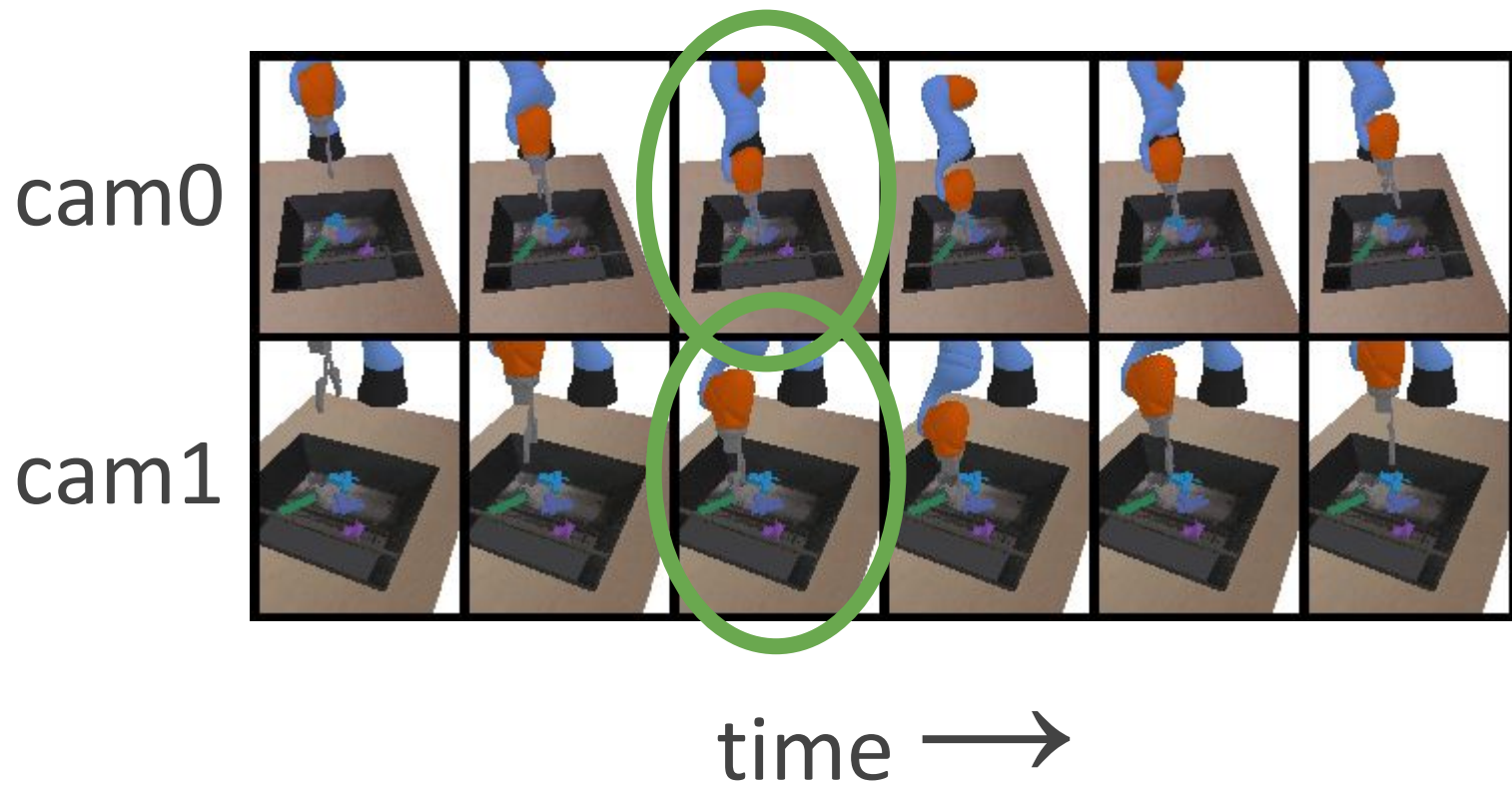
time →

self labelling by contrasting

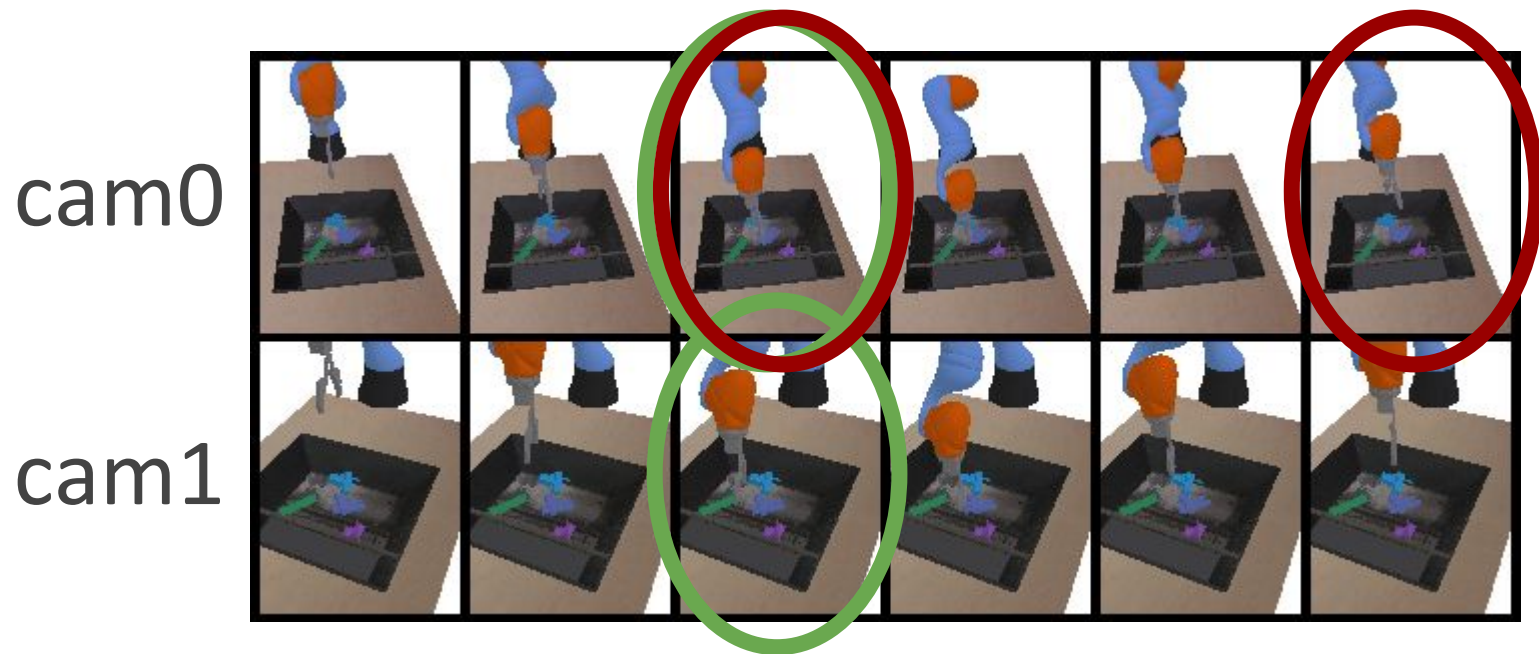


time →

self labelling by contrasting



self labelling by contrasting



"Time-Contrastive Networks: Self-Supervised Learning from Video" Sermanet et al.

in summary

- supervised
 - transfer learning

in summary

- supervised
 - transfer learning
- semi supervised
 - self training; get model to pseudo label

in summary

- supervised
 - transfer learning
- semi supervised
 - self training; get model to pseudo label
- self supervised
 - self labelling; use structure to weakly infer labels

self supervised learning & making use of unlabelled data

@mat_kelcey 