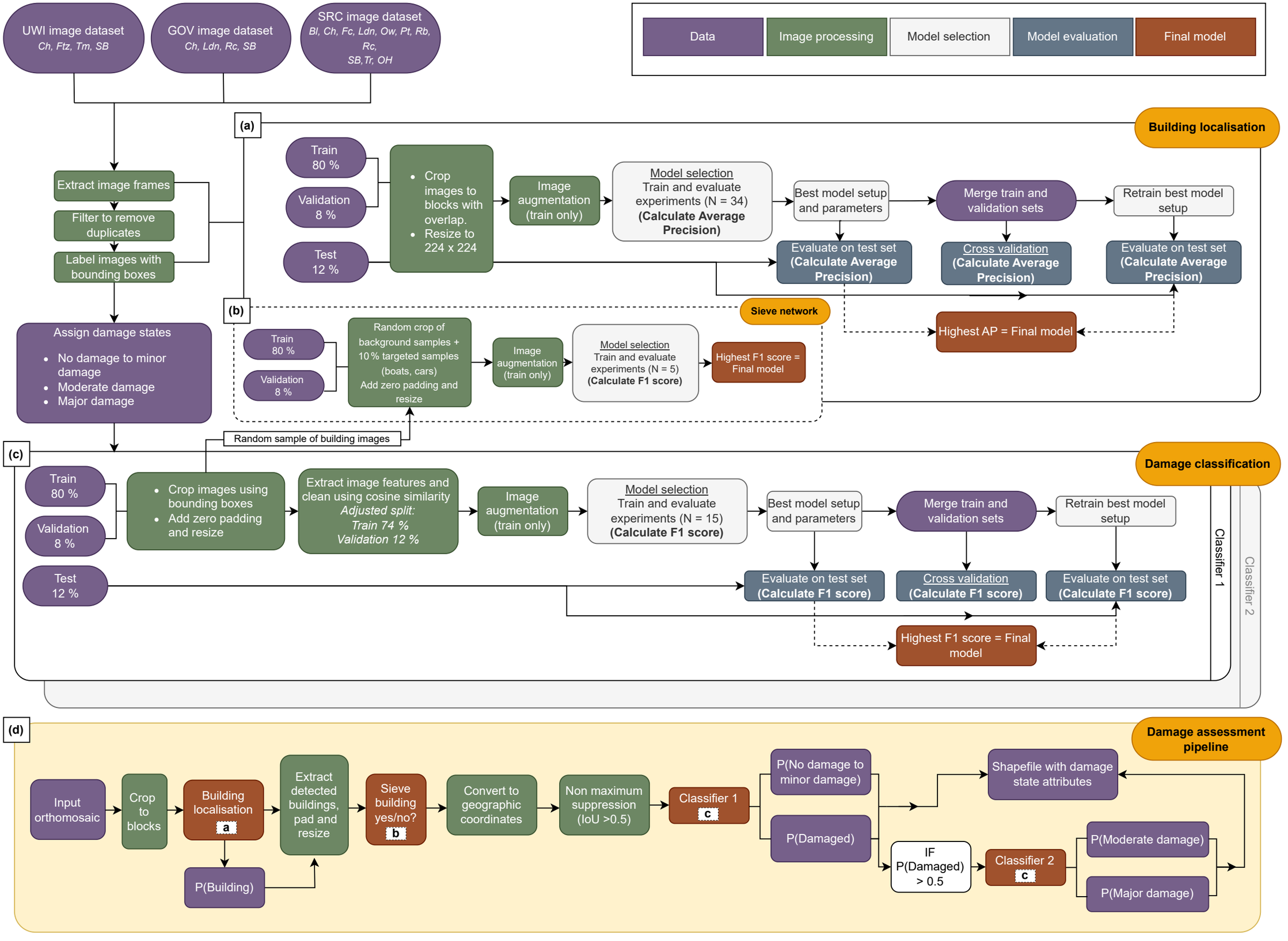
UWI image dataset
Ch, Ftz, Tm, SB
GOV image dataset
Ch, Ldn, Rc, SB
SRC image dataset
Bl, Ch, Fc, Ldn, Ow, Pt, Rb, Rc, SB,Tr, OH
Data
Image processing
Model selection
Model evaluation
Final model
(a)
Building localisation
Extract image frames
Filter to remove duplicates
Label images with bounding boxes
Train 80 %
Validation 8 %
Test 12 %
Crop images to blocks with overlap.
Resize to 224 x 224
Image augmentation (train only)
Model selection
Train and evaluate experiments (N = 34)
(Calculate Average Precision)
Best model setup and parameters
Merge train and validation sets
Retrain best model setup
Evaluate on test set (Calculate Average Precision)
Cross validation (Calculate Average Precision)
Evaluate on test set (Calculate Average Precision)
Highest AP = Final model
(b)
Sieve network
Train 80 %
Validation 8 %
Random crop of background samples + 10 % targeted samples (boats, cars)
Add zero padding and resize
Image augmentation (train only)
Model selection
Train and evaluate experiments (N = 5)
(Calculate F1 score)
Highest F1 score = Final model
Assign damage states
No damage to minor damage
Moderate damage
Major damage
Random sample of building images
(c)
Damage classification
Train 80 %
Validation 8 %
Test 12 %
Crop images using bounding boxes
Add zero padding and resize
Extract image features and clean using cosine similarity
Adjusted split:
Train 74 %
Validation 12 %
Image augmentation (train only)
Model selection
Train and evaluate experiments (N = 15)
(Calculate F1 score)
Best model setup and parameters
Merge train and validation sets
Retrain best model setup
Evaluate on test set (Calculate F1 score)
Cross validation (Calculate F1 score)
Evaluate on test set (Calculate F1 score)
Highest F1 score = Final model
Classifier 1
Classifier 2
(d)
Damage assessment pipeline
Input orthomosaic
Crop to blocks
Building localisation a
P(Building)
Extract detected buildings, pad and resize
Sieve building yes/no? b
Convert to geographic coordinates
Non maximum suppression (IoU >0.5)
Classifier 1 c
P(No damage to minor damage)
P(Damaged)
Shapefile with damage state attributes
IF P(Damaged) > 0.5
Classifier 2 c
P(Moderate damage)
P(Major damage)