

Wavelet Band-pass Filters for Matching Multiple Templates in Real-time



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User Provided Dataset I
One Logo per Frame

ZANTAC

Template Image



Frame Image

Horizontal



Vertical

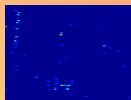


Diagonal

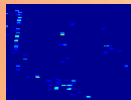


WBPs
filtered
results

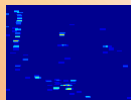
Scale = 20%



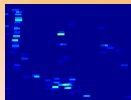
Scale = 30%



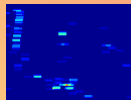
Scale = 40%



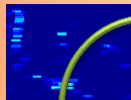
Scale = 50%



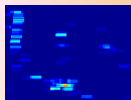
Scale = 60%



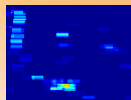
Scale = 70%



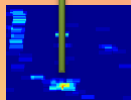
Scale = 80%



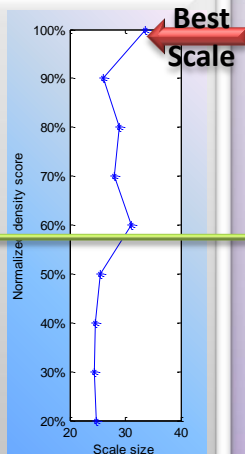
Scale = 90%



Scale = 100%



Normalized response density with respect to
different template scales



Matching Template

ZANTAC

Template Image



Frame Image

Horizontal



Vertical

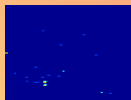


Diagonal

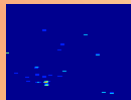


WBPFs
filtered
results

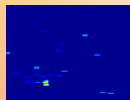
Scale = 20%



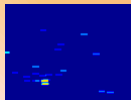
Scale = 30%



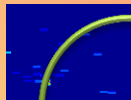
Scale = 40%



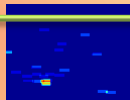
Scale = 50%



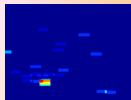
Scale = 60%



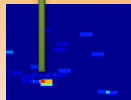
Scale = 70%



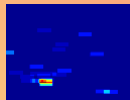
Scale = 80%



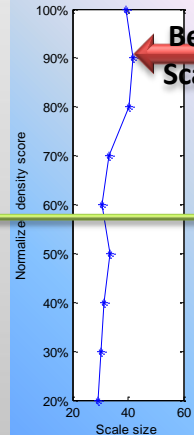
Scale = 90%



Scale = 100%



Normalized response density with respect to
different template scales



Max response
density in all
searching scale



Matching Template

Sprint.

Template Image



Frame Image

Horizontal



Vertical



Diagonal

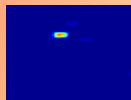


WBPFs
filtered
results

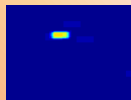
Scale = 20%



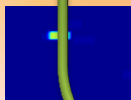
Scale = 30%



Scale = 40%



Scale = 50%



Scale = 60%



Scale = 70%



Scale = 80%



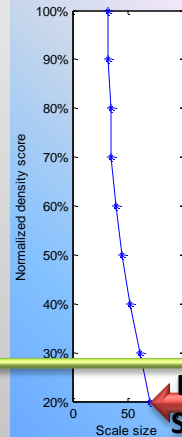
Scale = 90%



Scale = 100%



Normalized response density with respect to
different template scales



Max response
density in all
searching scale

**Best
Scale**

Matching Template



Sprint.

Template Image



Frame Image

Horizontal



Vertical

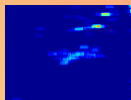


Diagonal

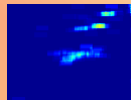


WBPFs
filtered
results

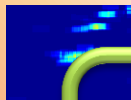
Scale = 20%



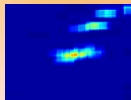
Scale = 30%



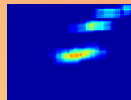
Scale = 40%



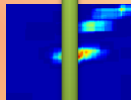
Scale = 50%



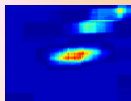
Scale = 60%



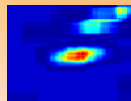
Scale = 70%



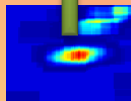
Scale = 80%



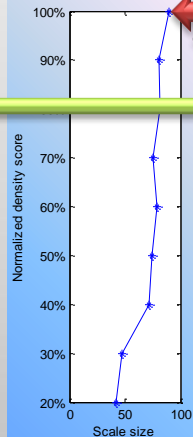
Scale = 90%



Scale = 100%

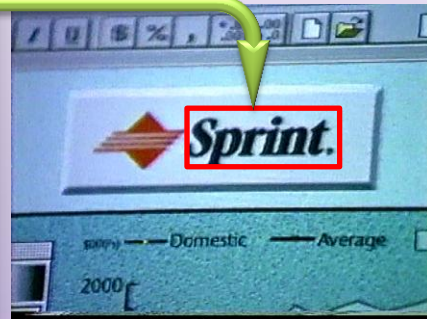


Normalized response density with respect to
different template scales



Max response
density in all
searching scale

Best
Scale



Matching Template



Template Image



Frame Image

Horizontal



Vertical



Diagonal



WBPFs
filtered
results

Scale = 20%



Scale = 30%



Scale = 40%



Scale = 50%



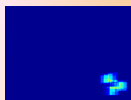
Scale = 60%



Scale = 70%



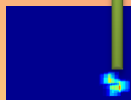
Scale = 80%



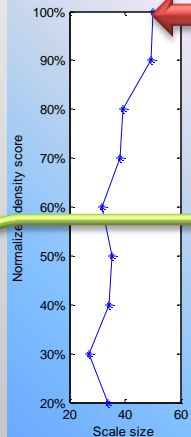
Scale = 90%



Scale = 100%



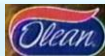
Normalized response density with respect to
different template scales



Max response
density in all
searching scale



Matching Template

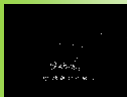


Template Image



Frame Image

Horizontal



Vertical

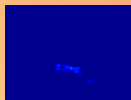


Diagonal

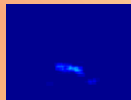


WBPFs
filtered
results

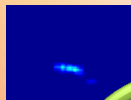
Scale = 20%



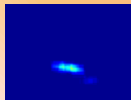
Scale = 30%



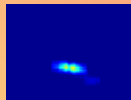
Scale = 40%



Scale = 50%



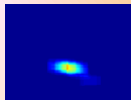
Scale = 60%



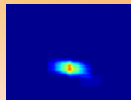
Scale = 70%



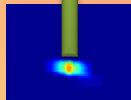
Scale = 80%



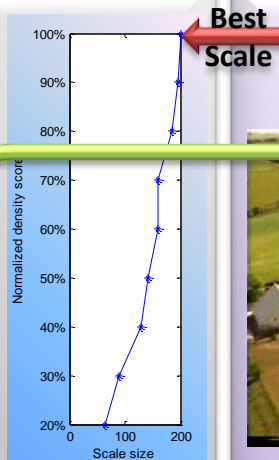
Scale = 90%



Scale = 100%



Normalized response density with respect to
different template scales



Max response
density in all
searching scale



Matching Template

Windex

Template Image



Frame Image

Horizontal



Vertical

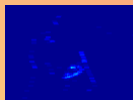


Diagonal

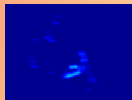


WBPFs
filtered
results

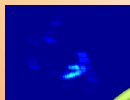
Scale = 20%



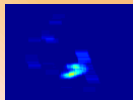
Scale = 30%



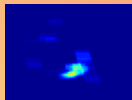
Scale = 40%



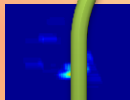
Scale = 50%



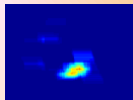
Scale = 60%



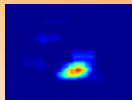
Scale = 70%



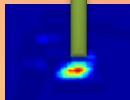
Scale = 80%



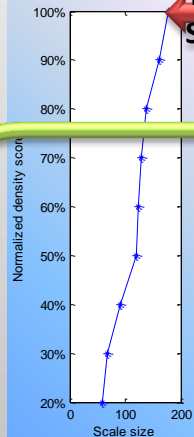
Scale = 90%



Scale = 100%



Normalized response density with respect to
different template scales



Max response
density in all
searching scale

Best
Scale



Matching Template

User Provided Dataset II
One Logo Class (Multiple Matching ROIs) per Frame



Template Image



Frame Image

Horizontal



Vertical

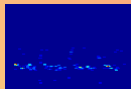


Diagonal

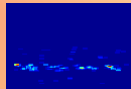


WBPFs
filtered
results

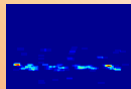
Scale = 20%



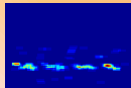
Scale = 30%



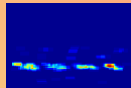
Scale = 40%



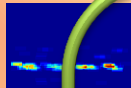
Scale = 50%



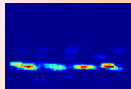
Scale = 60%



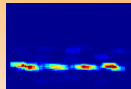
Scale = 70%



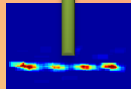
Scale = 80%



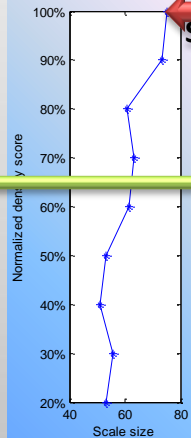
Scale = 90%



Scale = 100%



Normalized response density with respect to
different template scales



Max response
density in all
searching scale



Matching Template

Coca-Cola

Template Image



Frame Image

Horizontal



Vertical

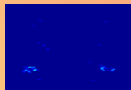


Diagonal

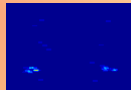


WBPFs
filtered
results

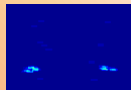
Scale = 20%



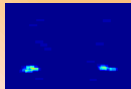
Scale = 30%



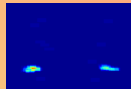
Scale = 40%



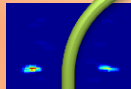
Scale = 50%



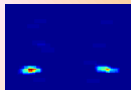
Scale = 60%



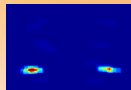
Scale = 70%



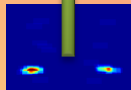
Scale = 80%



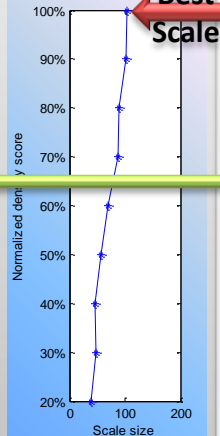
Scale = 90%



Scale = 100%



Normalized response density with respect to
different template scales



Max response
density in all
searching scale



Matching Template



Template Image



Frame Image

Horizontal



Vertical



Diagonal



WBPFs
filtered
results

Scale = 20%



Scale = 30%



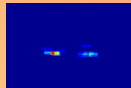
Scale = 40%



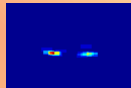
Scale = 50%



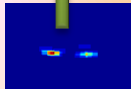
Scale = 60%



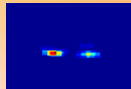
Scale = 70%



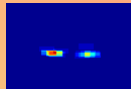
Scale = 80%



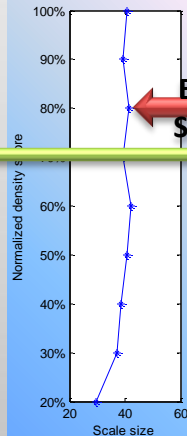
Scale = 90%



Scale = 100%



Normalized response density with respect to
different template scales



Max response
density in all
searching scale

Best
Scale



Matching Template



Template Image



Frame Image

Horizontal



Vertical



Diagonal

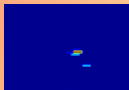


WBPFs
filtered
results

Scale = 20%



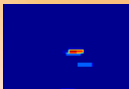
Scale = 30%



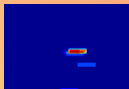
Scale = 40%



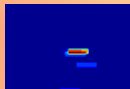
Scale = 50%



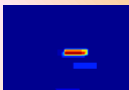
Scale = 60%



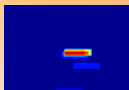
Scale = 70%



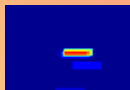
Scale = 80%



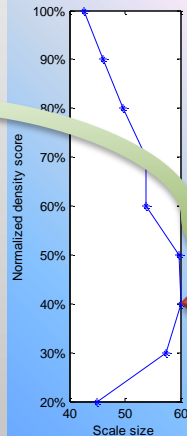
Scale = 90%



Scale = 100%



Normalized response density with respect to
different template scales



Max response
density in all
searching scale

Best
Scale



Matching Template