Deep Bimodal Regression for Apparent Personality Analysis

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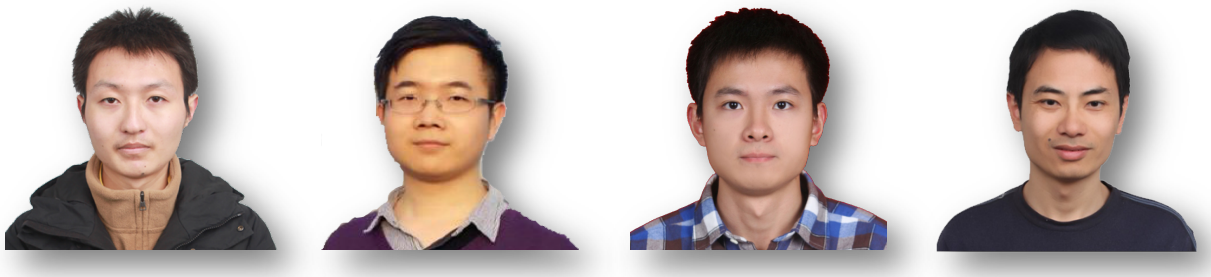

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EUROPEAN CONFERENCE ON COMPUTER VISION

Outline

LAMDA
Learning And Mining from DatA

- Backgrounds
- Deep Bimodal Regression (DBR)
- Implementation details
- Experimental results

Backgrounds

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Apparent personality analysis (APA):

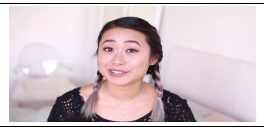
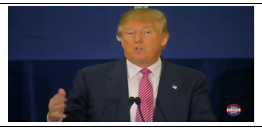
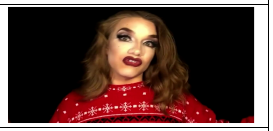
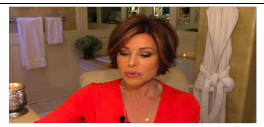
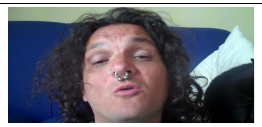
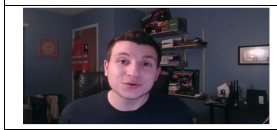
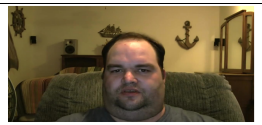
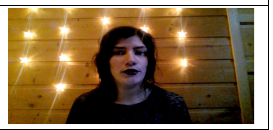
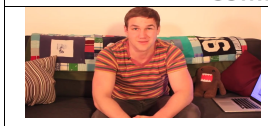
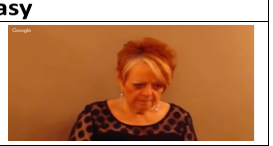
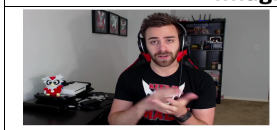
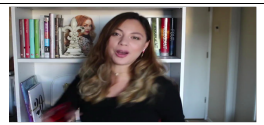
Agreeableness			
Authentic		Self-interested	
			
0.9230	0.9340	0.1098	0.0879
Conscientiousness			
Organized		Sloppy	
			
0.9708	0.9514	0.0873	0.1068
Extraversion			
Friendly		Reserved	
			
0.9158	0.9252	0.0521	0.0933
Neuroticism			
Comfortable		Uneasy	
			
0.9585	0.9791	0.1005	0.0872
Openness			
Imaginative		Practical	
			
0.9777	0.9582	0.0549	0.1113

Figure courtesy of [V. Ponce-López et. al., ECCV'16 LAP Workshop]

Backgrounds (con't)

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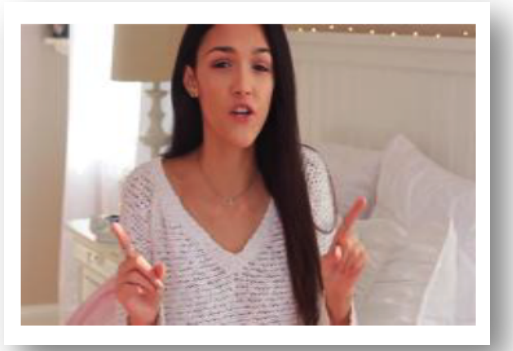
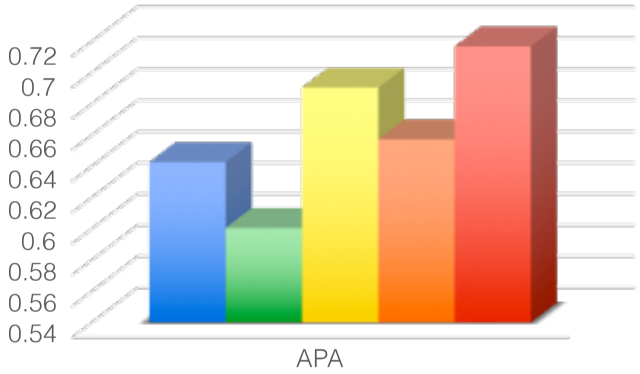
Apparent personality analysis:

Single image:





Videos:

Figures courtesy of [V. Ponce-López et. al., ECCV'16 LAP Workshop]

Deep Bimodal Regression (DBR)

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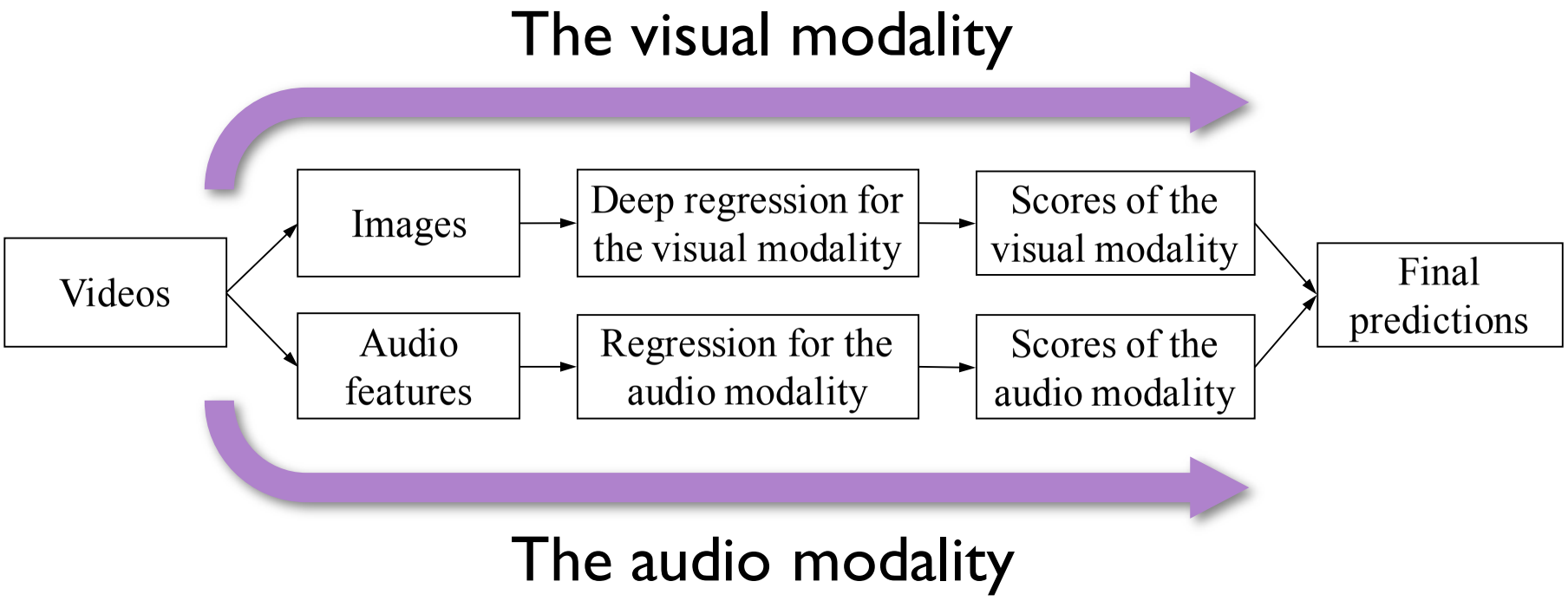
The proposed DBR framework:



DBR (con't)

The visual modality:

- Res-Net
- Descriptor Aggregation Network (DAN)
- DAN^{+}

The audio modality:

- The Logfbank feature
- Linear regression

Descriptor Aggregation Network (DAN)

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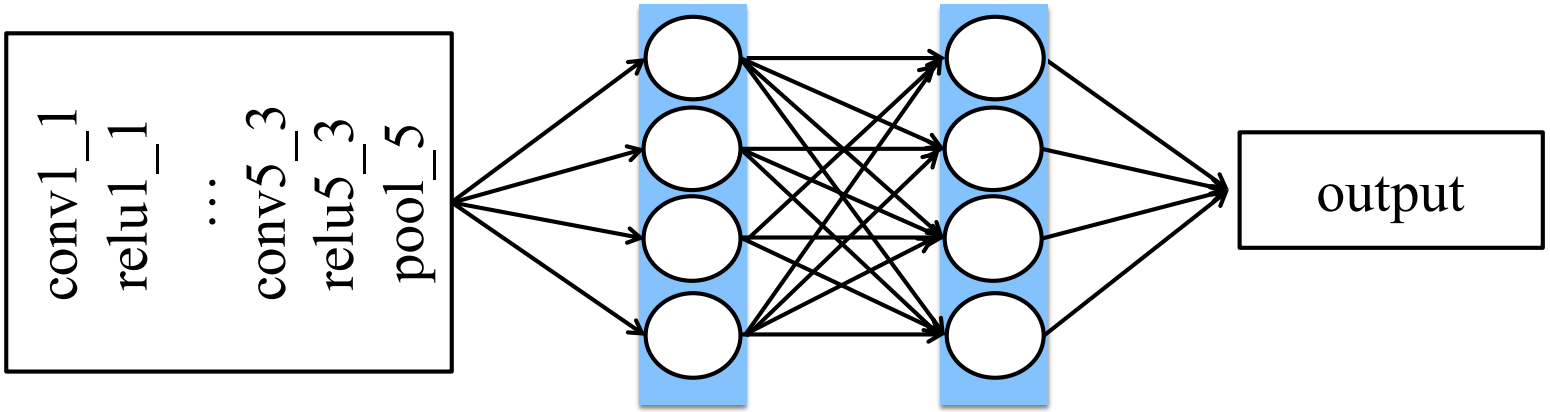
Traditional CNN (VGG-16):



Descriptor Aggregation Network (DAN)

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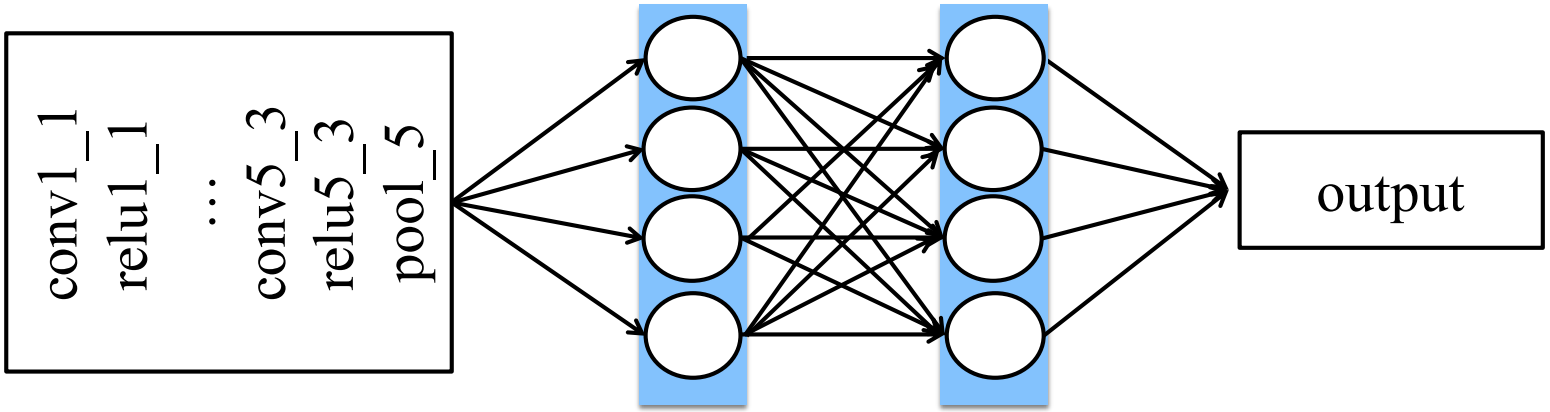
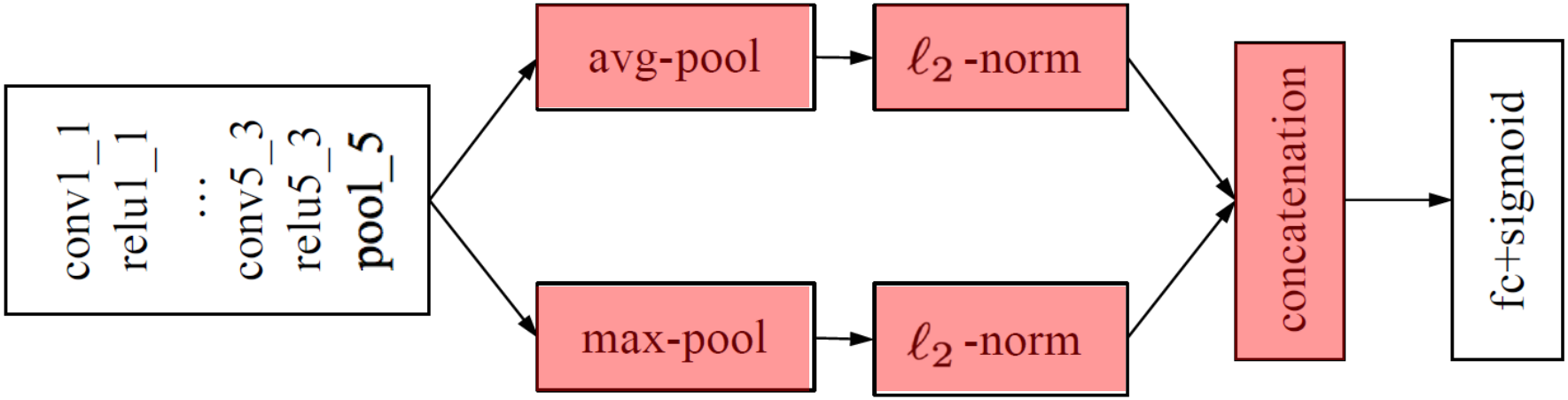
Traditional CNN (VGG-16):



DAN:



DAN and DAN+

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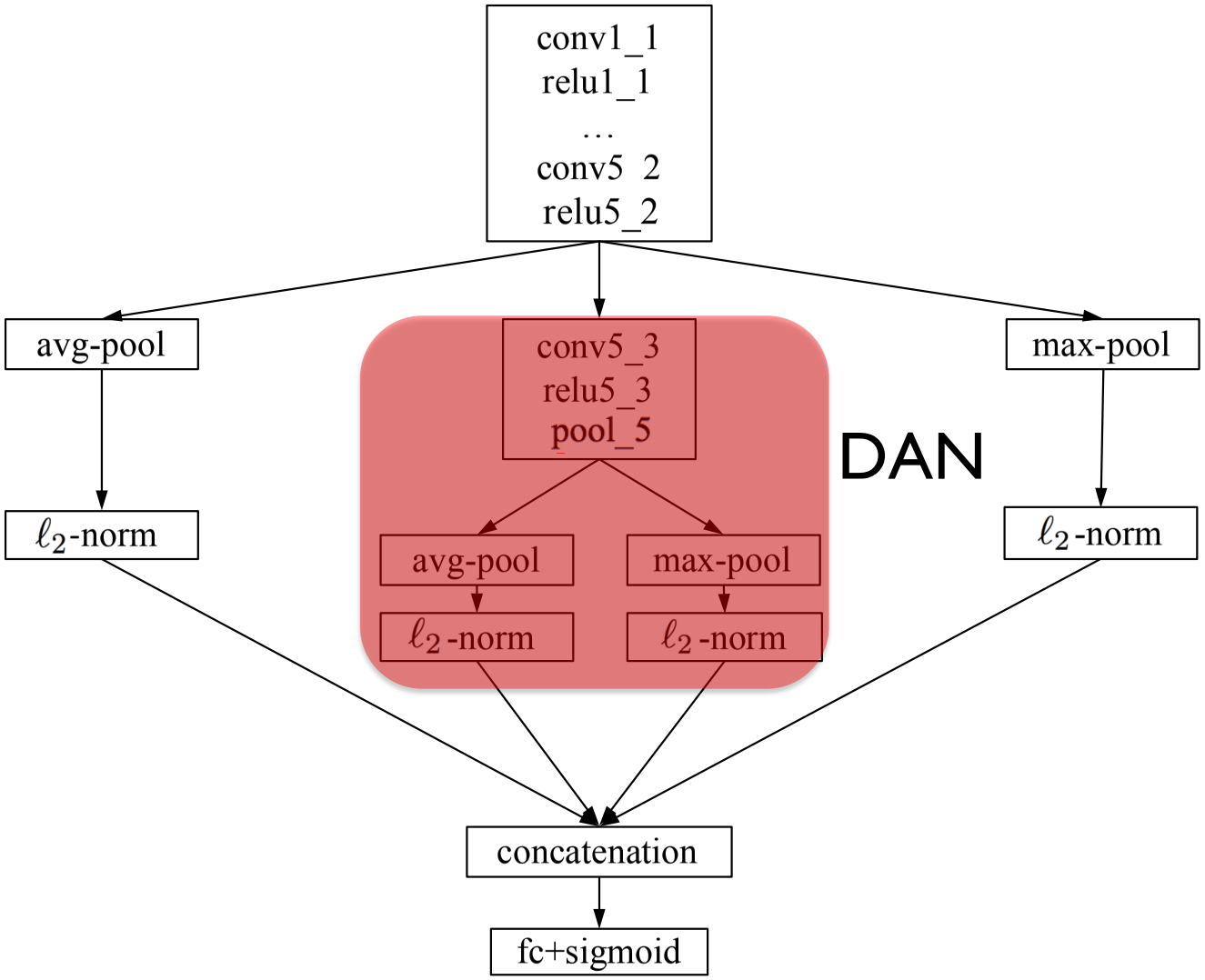
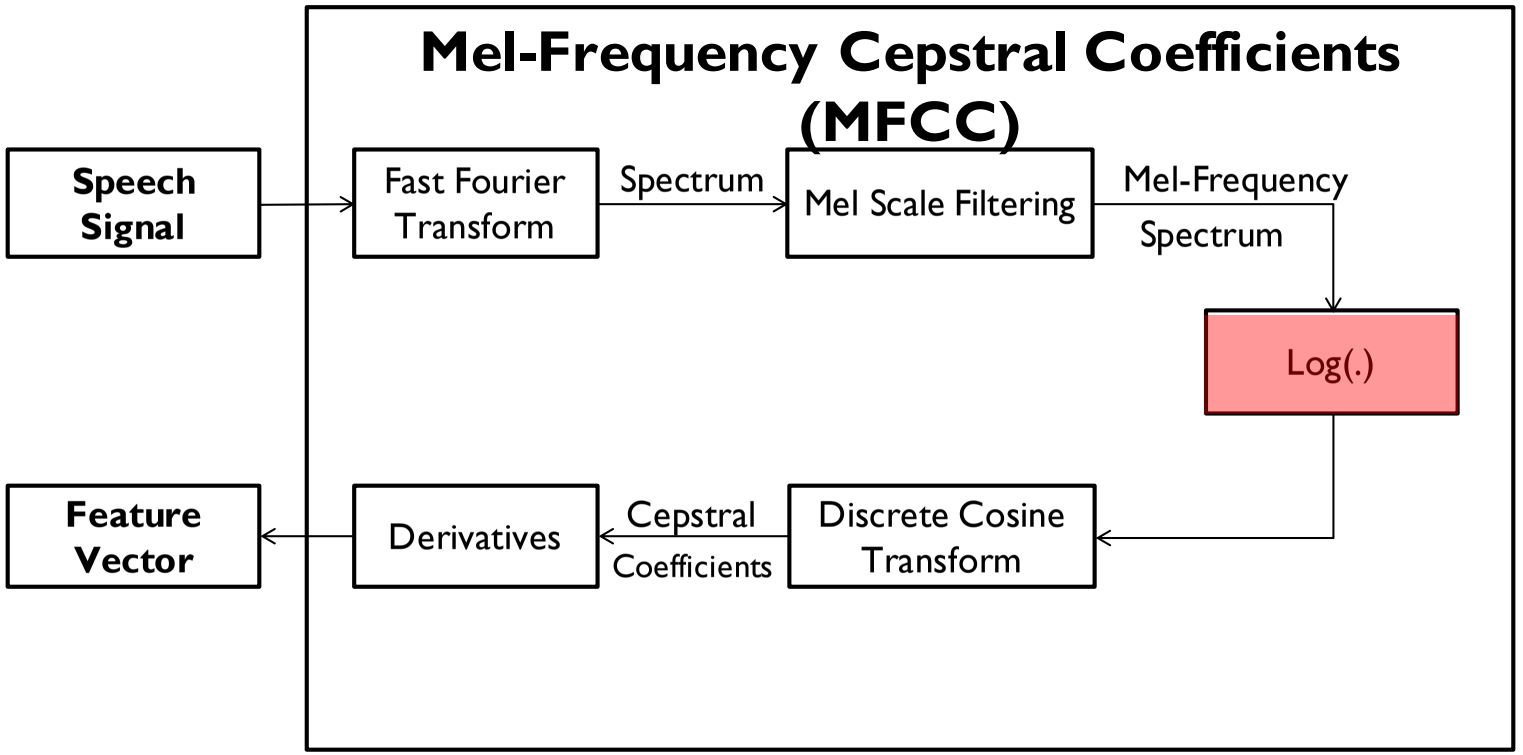
DAN+:



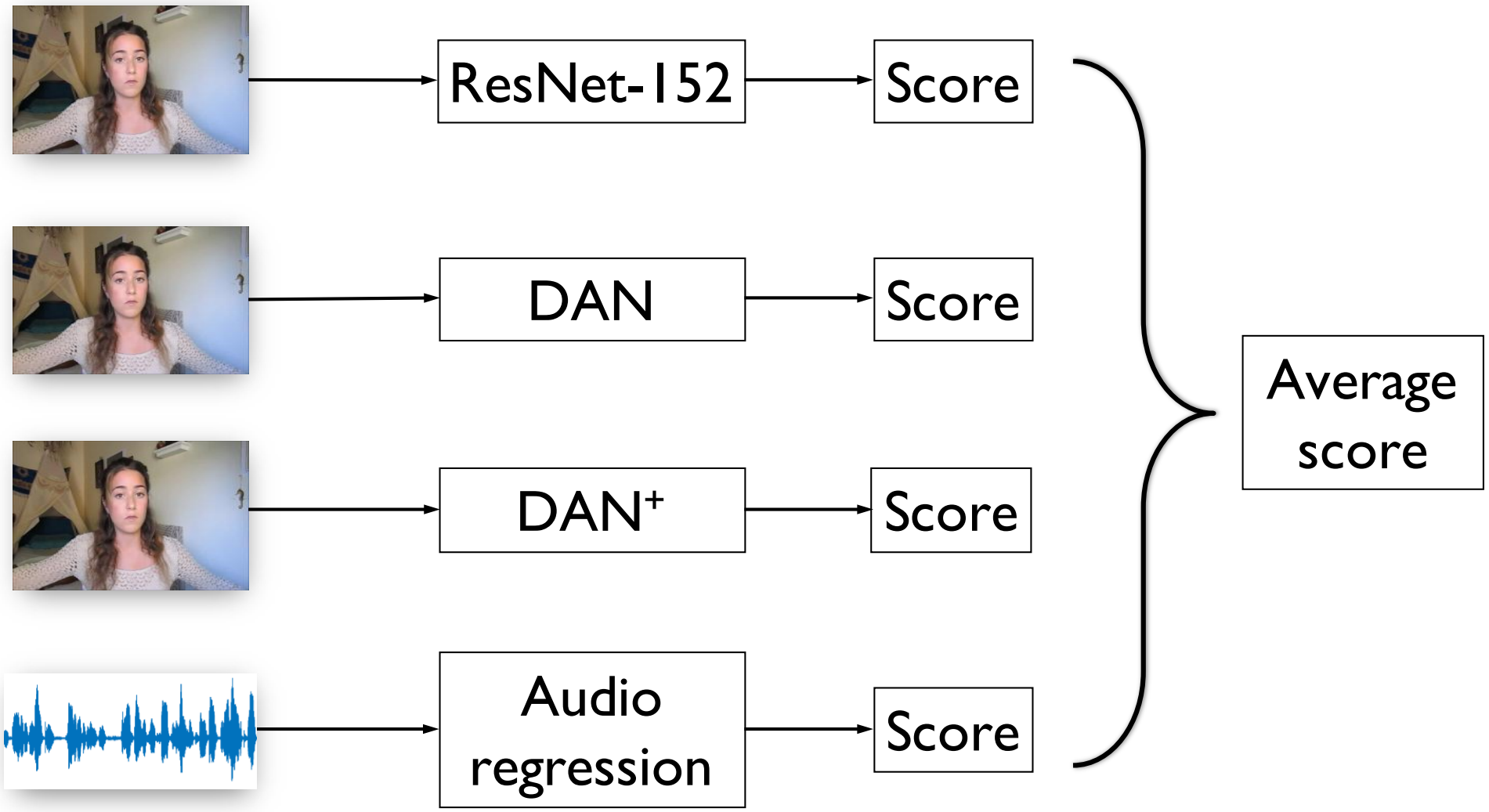
Audio modality

- The MFCC feature
- The logfbank feature



- Linear regression

Modality ensemble



Implementation details

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Extracting images from the original videos:

Implementation details (con't)

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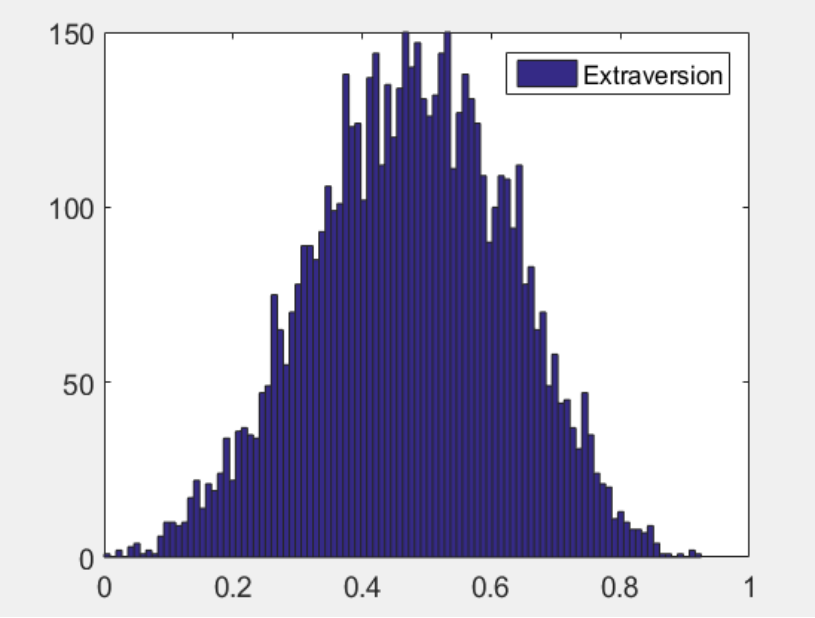
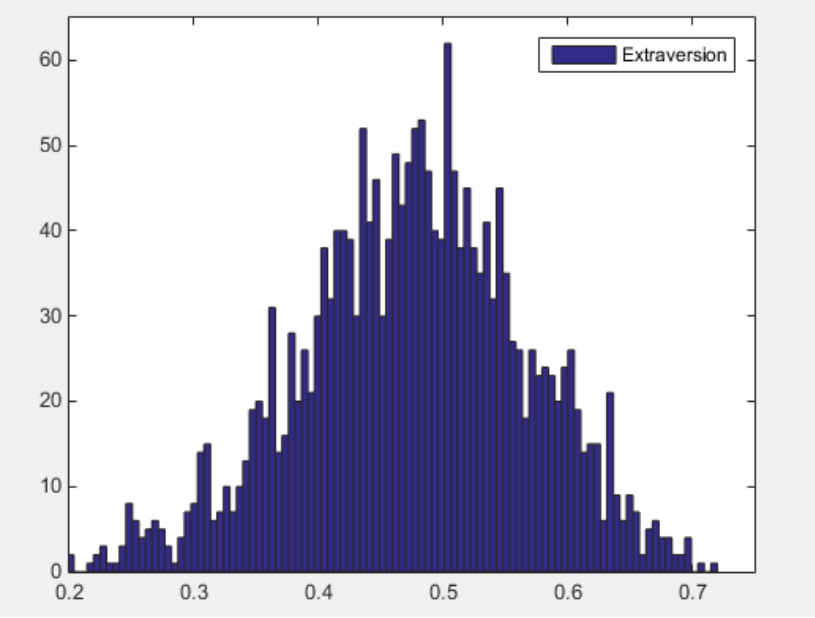
The distributions of video labels:

Training



Testing



Experiment results

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Single model comparison at the training stage:

Modality	Model	♯ Para.	Dim.	*Epoch 1*	*Epoch 2*	*Epoch Fusion*
Visual	VGG-Face	134.28M	4,096	0.9065	0.9060	0.9072
	ResNet	58.31M	512	0.9072	0.9063	0.9080
	DAN	14.71M	1,024	0.9082	0.9080	0.9100
	DAN$^+$	14.72M	2,048	0.9100	0.9103	0.9111
Audio	Linear regressor	0.40M	79,534	0.8900	–	0.8900

Model speed testing on a GTX 1080 GPU:

Inference speed	Single image	Whole video
VGG-Face	15ms	400ms
Res-Net	149ms	450ms
DAN	12ms	389ms
DAN$^+$	13ms	390ms

Experiment results (con't)

Fusion accuracy at the final testing stage:

Rank	Team name	*Mean Acc.*	*Extra.*	*Agree.*	*Consc.*	*Neuro.*	*Open.*
1	**Ours**	**0.9130**	0.9133	**0.9126**	**0.9166**	**0.9100**	**0.9123**
2	evolgen	0.9121	0.9150	0.9119	0.9119	0.9099	0.9117
3	DCC	0.9109	0.9107	0.9102	0.9138	0.9089	0.9111
4	ucas	0.9098	0.9129	0.9091	0.9107	0.9064	0.9099
5	BU-NKU	0.9094	**0.9161**	0.9070	0.9133	0.9021	0.9084

Visualization

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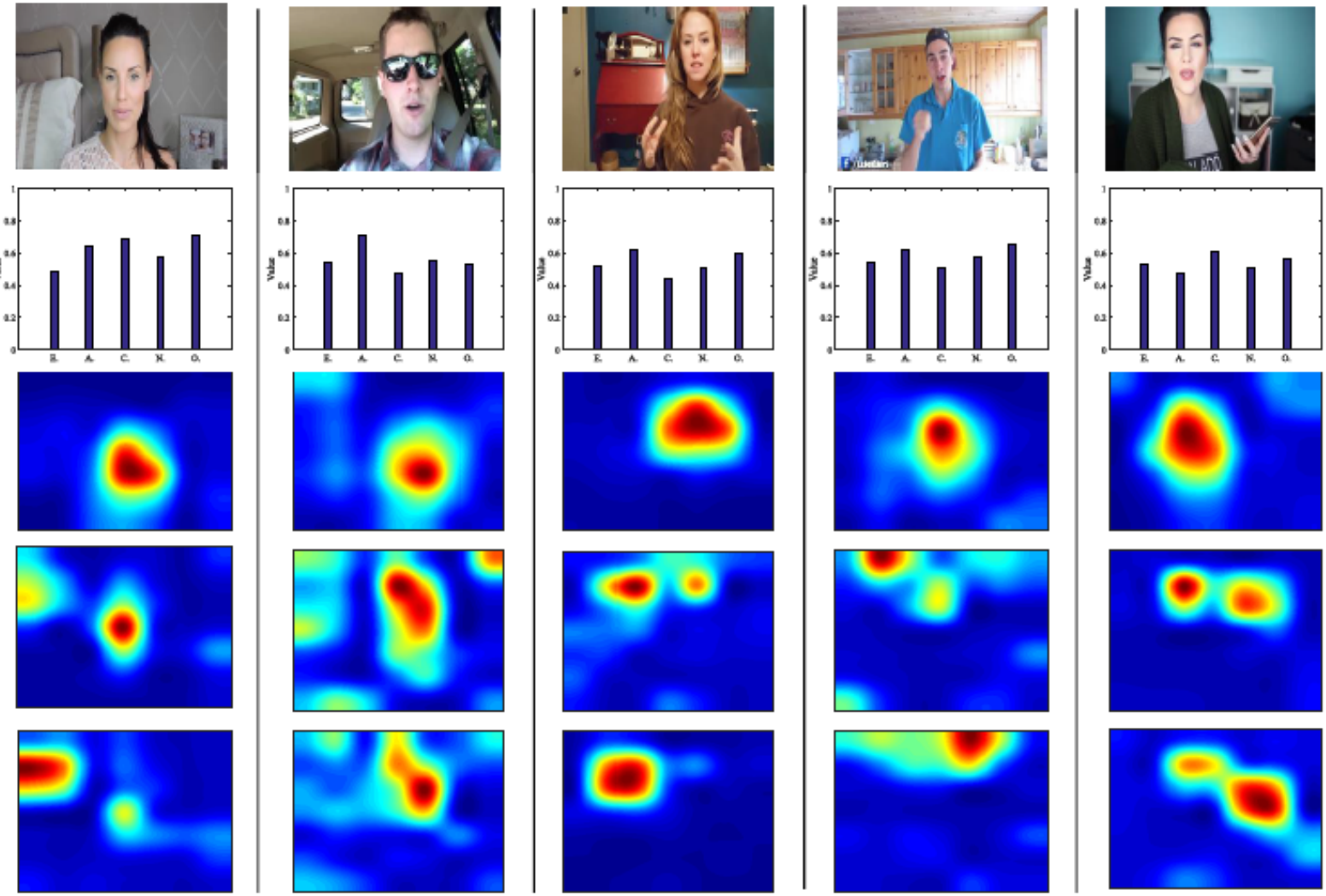
ResNet-152

DAN

DAN+



Future works

- Train more discriminative deep audio representations;
- Try to use the time series information for further improving the visual modality's accuracy

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Thank you!

Our source codes can be found via:
https://github.com/tzzcl/ChaLearn-APA-Code