Scattering-based hybrid network for facial attribute classification

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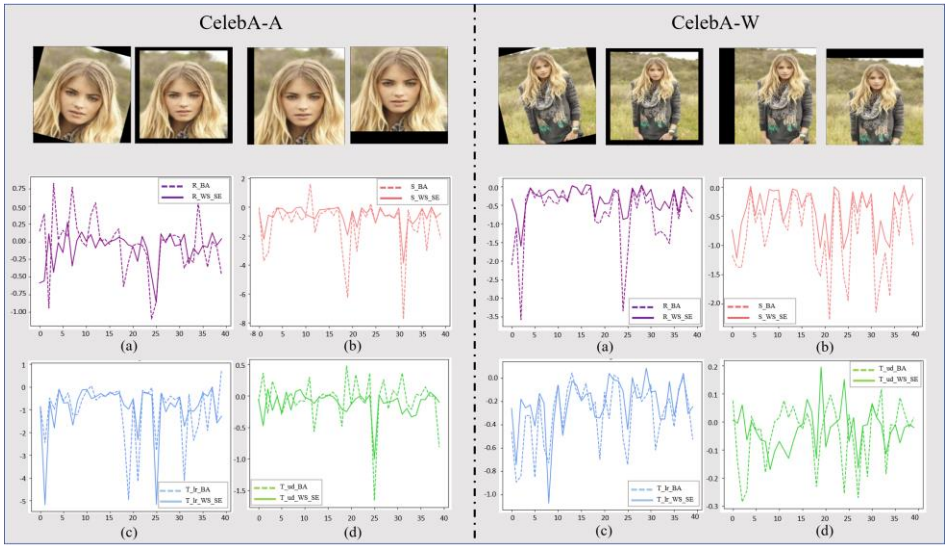
Frontiers of Computer Science, DOI: 10.1007/s11704-023-2570-6

Problems & Ideas

- Problems of conventional FAC-based challenges:
  - Extracted attribute textures are not fine-grained enough.
  - Popular CNN framework induces a risk of non-robust attribute representations.
  - Complex inter-attribute relationships.
- Ideas: Find a method which is invariant to small-scale image affine transformations; Find an approach to decrease the redundant correlations among attributes.
  - The wavelet scattering transform (WST) can be seen as a CNN with fixed predetermined filters, and has been shown to satisfy deformation stability
  - Causal structure among multiple labels can enhance the generalization of the model.

Main Contributions

- Contributions:
  - A novel and flexible WS-SE Block is proposed to integrate WST into CNN. To the best of our knowledge, this is the first attempt to introduce WST into the FAC task;
  - The attributes are classified into *cause attributes* and *effect attributes* from a causal view, and the causality-related information is used to improve the classifier decision performance;
  - The proposed hybrid network is shown to compensate for the sensitivity of CNN to small-scale affine transformations.



The MA change of small-scale affine transformation in the CelebA-A and CelebA-W datasets, where (a), (b), (c), and (d) represents rotation, scaling, left-right and up-down translation, respectively.