

CLAIMS

What is claimed is:

- 5 1. A computer-implemented method of image classification using at least one processor, the method comprising:
- providing a set of category mapping discriminators, each corresponding to a respective category, wherein each category mapping discriminator of the set of category mapping discriminators is configured for discriminating features relating to input images
- 10 that belong to the respective category of the category mapping discriminator;
- extracting a plurality of features from an input image using a machine learning model;
- determining, for each of the set of category mapping discriminators, an output value based on the plurality of extracted features using the category mapping
- 15 discriminator; and
- determining a classification of the input image based on the output values of the set of category mapping discriminators;
- wherein the providing the set of category mapping discriminators further comprises generating one or more new category mapping discriminators corresponding to
- 20 one or more new categories, respectively, each new category mapping discriminator is configured for discriminating features relating to input images that belong to the
- respective new category of the new category mapping discriminator, and incorporating the one or more new category mapping discriminators into the set of category mapping
- discriminators to obtain an updated set of category mapping discriminators; and wherein
- 25 said generating one or more new category discriminators is based on a meta learning model using a training dataset in relation to the one or more new categories, wherein the
- meta learning model is configured to correlate a plurality of sample features from the training dataset in relation to the respective new category and maps the plurality of
- sample features to parameters of the new category mapping discriminator.

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2. The method of claim 1, wherein the set of category mapping discriminators are each configured to separate a feature space into different regions each associated to a respective category of a corresponding category mapping discriminator, and each category mapping discriminator is configured to serve as a non-linear decision boundary that
5 encloses a region belonging to the respective category of the category mapping discriminator in the feature space.

3. The method of claim 1, wherein the set of category mapping discriminators each comprises a corresponding set of parameters configured for identifying features
10 relating to input images that belong to the respective category of the category mapping discriminator.

4. The method of claim 1, wherein each category mapping discriminator of
15 the set of category mapping discriminators is configured to generate an high-output value based on the features relating to input images that belong to the respective category corresponding to the category mapping discriminator and another-low-output value based
on the features relating to input images that do not belong to the respective category.

20 5. The method of claim 4, wherein said determining a classification for the input image based on the output values of the set of category mapping discriminators comprises determining a label associated to the category for the input image based on a corresponding category mapping discriminator having the highest output value among the set of category mapping discriminators.

25 6. ~~The method of claim 1,~~ The method of claim 1, further comprising the step of feedforwarding the samples features through the meta learning model without requiring fine-tuning or parameter updates. wherein said providing a set of category mapping discriminators further comprises generating one or more new category mapping
30 discriminators corresponding to one or more new categories, respectively, each new category mapping discriminator is configured for discriminating features relating to input

images that belong to the respective new category of the new category mapping discriminator, and incorporating the one or more new category mapping discriminators into the set of category mapping discriminators to obtain an updated set of category mapping discriminators.

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7. ~~The method of claim 6~~The method of claim 1, wherein the meta learning model comprises a function that maps features of category samples to a plurality of weights w of each of the new category mapping discriminator ~~said generating one or more new category discriminators is based on a meta learning model using a training dataset in relation to the one or more new categories.~~

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8. The method of claim 7~~1~~, wherein the training dataset comprises a set of tasks, each task comprising a training set and a testing set.

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9. The method of claim 7~~1~~, wherein the meta learning model correlates a plurality of sample features from the training set in relation to a new category and maps the plurality of sample features to parameters of a new category mapping discriminator.

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10. The method of claim 1, wherein the machine learning model comprises a neural network.

11. A system for image classification, the system comprising:
a memory; and

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at least one processor communicatively coupled to the memory and configured to:

provide a set of category mapping discriminators, each corresponding to a respective category, wherein each category mapping discriminator of the set of category mapping discriminators is configured for discriminating features relating to input images that belong to the respective category of the category mapping discriminator;

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extract a plurality of features from an input image using a machine learning model;

determine, for each of the set of category mapping discriminators, an output value based on the plurality of extracted features using the category mapping discriminator; and determine a classification of the input image based on the output values of the set of category mapping discriminators;

- 5 wherein the at least one processor is further configured to: generate one or more new category discriminators corresponding to one or more new categories, respectively, each new category mapping discriminator is configured for discriminating features relating to input images that belong to the respective new category of the new category mapping discriminator, and incorporate the one or more new category mapping
10 discriminators into the set of category mapping discriminators to obtain an updated set of category mapping discriminators;
 wherein the generation of one or more new category discriminators is based on a meta learning model using a training dataset in relation to the one or more new
15 categories, and wherein the meta learning model is configured to correlate a plurality of sample features from the training dataset in relation to the respective new category and maps the plurality of sample features to parameters of the new category mapping
 discriminator.

12. The system according to claim 11, wherein the set of category mapping
20 discriminators are each configured to separate a feature space into different regions each associated to a respective category of a corresponding category mapping discriminator, and each category mapping discriminator is configured to serve as a non-linear decision boundary that encloses a region belonging to the respective category of the category mapping discriminator in the feature space.

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13. The ~~method~~-system of claim 11, wherein the set of category mapping
discriminators each comprises a corresponding set of parameters configured for identifying
features relating to input images that belong to a respective category of the category
mapping discriminator.

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14. The system according to claim 11, wherein each category mapping discriminator of the set of category mapping discriminators is configured to generate an ~~high~~ output value based on features relating to input images that belong to a respective category corresponding to the category mapping discriminator and another ~~low~~ output value based on features relating to input images that does not belong to the respective category.

15. The system according to claim 14, wherein said determining a classification for the input image based on the output values of the set of category mapping discriminators comprises determining a label associated to a category for the input image based on a corresponding category mapping discriminator having the highest output value among the set of category mapping discriminators.

16. The system according to claim 11, wherein the at least one processor is configured to feedforward the samples features through the meta learning model without requiring fine-tuning or parameter updates, ~~wherein said providing a set of category mapping discriminators further comprises generating one or more new category discriminators corresponding to one or more new categories, respectively, each new category mapping discriminator is configured for discriminating features relating to input images that belong to the respective new category of the new category mapping discriminator, and incorporating the one or more new category mapping discriminators into the set of category mapping discriminators to obtain an updated set of category mapping discriminators.~~

17. The system of claim ~~16~~ 11, wherein the meta learning model comprises a function that maps features of category samples to a plurality of weights w of each of the new category mapping discriminator ~~wherein said generating one or more new category discriminators is based on a meta learning model using a training dataset in relation to the one or more new categories.~~

18. The system of claim ~~47~~11, wherein the training dataset comprises a set of tasks, each task comprising a training set and a testing set.

19. The system of claim ~~46~~11, wherein the meta learning model correlates a plurality of sample features from the training dataset in relation to a new category and maps the plurality of sample features to parameters of a new category mapping discriminator.

20. A computer program product, embodied in one or more non-transitory computer-readable storage mediums, comprising instructions executable by at least one processor to perform a method of image classification, the method comprising:

providing a set of category mapping discriminators, each corresponding to a respective category, wherein each category mapping discriminator of the set of category mapping discriminators is configured for discriminating features relating to input images that belong to the respective category of the category mapping discriminator;

extracting a plurality of features from an input image using a machine learning model;

determining, for each of the set of category mapping discriminators, an output value based on the plurality of extracted features using the category mapping discriminator; and

determining a classification of the input image based on the output values of the set of category mapping discriminators;

wherein the providing the set of category mapping discriminators further comprises generating one or more new category mapping discriminators corresponding to one or more new categories, respectively, each new category mapping discriminator is configured for discriminating features relating to input images that belong to the respective new category of the new category mapping discriminator, and incorporating the one or more new category mapping discriminators into the set of category mapping discriminators to obtain an updated set of category mapping discriminators; and wherein said generating one or more new category discriminators is based on a meta learning model using a training dataset in relation to the one or more new categories, wherein the meta learning model is configured to correlate a plurality of sample features from the training dataset in relation

to the respective new category and maps the plurality of sample features to parameters of the new category mapping discriminator.