The HAM10000 training set includes pigmented lesions from different populations. The Austrian image set consists of lesions of patients referred to a tertiary European referral center specialized for early detection of melanoma in high risk groups. This group of patients often have a high number of nevi and a personal or family history of melanoma. The Australian image set includes lesions from patients of a primary care facility in a high skin cancer incidence area. Australian patients are typified by severe chronic sun damage. Chronic sun damaged skin is characterized by multiple solar lentigines and ectatic vessels, which are often present in the periphery of the target lesion. Very rarely also small angiomas and seborrheic keratoses may collide with the target lesion. We did not remove this "noise" and we also did not remove terminal hairs because it reflects the situation in clinical practice. In most cases, albeit not always, the target lesion is in the center of the image. Dermatoscopic images of both study sites were taken by different devices using polarized and non-polarized dermatoscopy. The set includes representative examples of pigmented skin lesions that are practically relevant. More than 95% of all lesion encountered during clinical practice will fall into one of the seven diagnostic categories. In practice, the task of the clinician is to differentiate between malignant and benign lesions, but also to make specific diagnoses because different malignant lesions, for example melanoma and basal cell carcinoma, may be treated in a different way and timeframe. With the exception of vascular lesions, which are pigmented by hemoglobin and not by melanin, all lesions have variants that are completely devoid of pigment (for example amelanotic melanoma). Non-pigmented lesions, which are more diverse and have a larger number of possible differential diagnoses, are not part of this set.

The following description of diagnostic categories is meant for computer scientists who are not familiar with the dermatology literature:

**akiec**

Actinic Keratoses (Solar Keratoses) and Intraepithelial Carcinoma (Bowen’s disease) are common non-invasive, variants of squamous cell carcinoma that can be treated locally without surgery. Some authors regard them as precursors of squamous cell carcinomas and not as actual carcinomas. There is, however, agreement that these lesions may progress to invasive squamous cell carcinoma – which is usually not pigmented. Both neoplasms commonly show surface scaling and commonly are devoid of pigment. Actinic keratoses are more common on the face and Bowen’s disease is more common on other body sites. Because both types are induced by UV-light the surrounding skin is usually typified by severe sun damaged except in cases of Bowen’s disease that are caused by human papilloma virus infection and not by UV. Pigmented variants exist for Bowen’s disease[20](https://www.nature.com/articles/sdata2018161#ref20) and for actinic keratoses[21](https://www.nature.com/articles/sdata2018161#ref21), and both are included in this set.

The dermatoscopic criteria of pigmented actinic keratoses and Bowen’s disease are described in detail by Zalaudek *et al*.[22](https://www.nature.com/articles/sdata2018161#ref22),[23](https://www.nature.com/articles/sdata2018161#ref23) and by Cameron *et al*.[20](https://www.nature.com/articles/sdata2018161#ref20).

**bcc**

Basal cell carcinoma is a common variant of epithelial skin cancer that rarely metastasizes but grows destructively if untreated. It appears in different morphologic variants (flat, nodular, pigmented, cystic), which are described in more detail by Lallas *et al*.[24](https://www.nature.com/articles/sdata2018161#ref24).

**bkl**

"Benign keratosis" is a generic class that includes seborrheic keratoses ("senile wart"), solar lentigo - which can be regarded a flat variant of seborrheic keratosis - and lichen-planus like keratoses (LPLK), which corresponds to a seborrheic keratosis or a solar lentigo with inflammation and regression[25](https://www.nature.com/articles/sdata2018161#ref25). The three subgroups may look different dermatoscopically, but we grouped them together because they are similar biologically and often reported under the same generic term histopathologically. From a dermatoscopic view, lichen planus-like keratoses are especially challenging because they can show morphologic features mimicking melanoma[26](https://www.nature.com/articles/sdata2018161#ref26) and are often biopsied or excised

for diagnostic reasons. The dermatoscopic appearance of seborrheic keratoses varies according to anatomic site and type[27](https://www.nature.com/articles/sdata2018161#ref27).

**df**

Dermatofibroma is a benign skin lesion regarded as either a benign proliferation or an inflammatory reaction to minimal trauma. The most common dermatoscopic presentation is reticular lines at the periphery with a central white patch denoting fibrosis[28](https://www.nature.com/articles/sdata2018161#ref28).

**nv**

Melanocytic nevi are benign neoplasms of melanocytes and appear in a myriad of variants, which all are included in our series. The variants may differ significantly from a dermatoscopic point of view. In contrast to melanoma they are usually symmetric with regard to the distribution of color and structure[29](https://www.nature.com/articles/sdata2018161#ref29).

**mel**

Melanoma is a malignant neoplasm derived from melanocytes that may appear in different variants. If excised in an early stage it can be cured by simple surgical excision. Melanomas can be invasive or non-invasive (in situ). We included all variants of melanoma including melanoma in situ, but did exclude non-pigmented, subungual, ocular or mucosal melanoma.

Melanomas are usually, albeit not always, chaotic, and some melanoma specific criteria depend on anatomic site[23](https://www.nature.com/articles/sdata2018161#ref23),[30](https://www.nature.com/articles/sdata2018161#ref30).

**vasc**

Vascular skin lesions in the dataset range from cherry angiomas to angiokeratomas[31](https://www.nature.com/articles/sdata2018161#ref31) and pyogenic granulomas[32](https://www.nature.com/articles/sdata2018161#ref32). Hemorrhage is also included in this category.

Angiomas are dermatoscopically characterized by red or purple color and solid, well circumscribed structures known as red clods or lacunes.

The number of images in the datasets does not correspond to the number of unique lesions, because we also provide images of the same lesion taken at different magnifications or angles ([Fig. 4](https://www.nature.com/articles/sdata2018161#f4)), or with different cameras. This should serve as a natural data-augmentation as it shows random transformations and visualizes both general and local features.