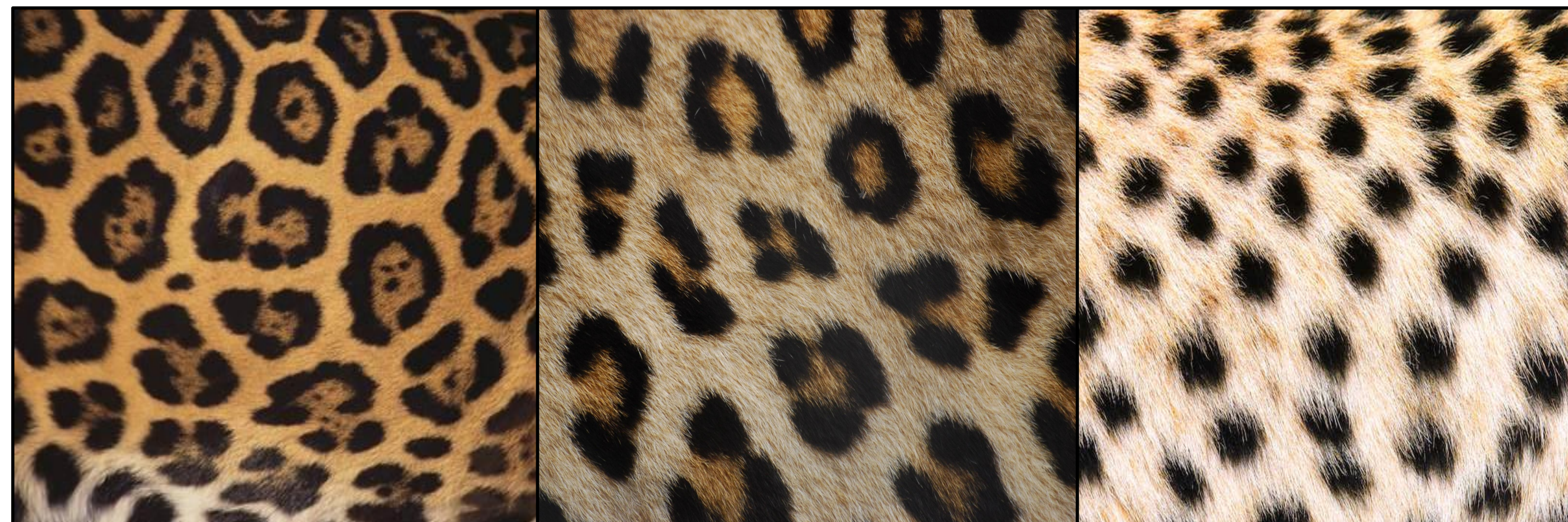




Why Study Texture?

- Fundamental component of **perception**
- Characterize **materials and objects** in the world around us
- Good texture representations allow us to **recognize, categorize, synthesize, and retrieve** images based on texture.
- Useful for fine-grained recognition, material recognition, texture synthesis, scene understanding, and semantic segmentation



Texture in the Wild: Jaguar print, Leopard print, Cheetah print. Distinguishing between textures enables fine-grained classification of similar-looking animals.

Incorporating Natural Language

- **General attributes** are useful, but do not always provide enough information
 - “**Spotted cat fur**”
 - applies to all 3 of the above images
- Incorporating **more detail** into **description** of textures or patterns in images can allow us to tell similar objects apart more easily
- Can **represent a wider range** of textures when using more detailed descriptions vs. attributes

Attribute label: “Polka-dotted”



“Small green polka-dots on white background”



“Large white polka-dots on green background”

Describable Texture Dataset (Cimpoi et al, 2014):

The given attribute for both images is “**polka-dotted.**”

Our goal: Incorporate **natural language descriptions** to provide a richer understanding of texture.

Related Work

- **Describable Texture Dataset** (Cimpoi et al., 2014)
 - **Texture** dataset with 1-3 **attributes** per image
 - 47 different **texture attribute** labels, no color information.
- **Learning Deep Representations of Fine-Grained Visual Descriptions** (Reed et al. 2016)
 - **Natural language** descriptions of **bird and flower species** for fine-grained recognition, not detailed descriptions of **texture**.
- **Reasoning about Fine-grained Attribute phrases using Reference Games** (Su et al., 2017)
 - Describe **differences** between similar-looking **objects** with **attribute phrases**.



We want to expand attributes and phrases to **natural language descriptions** of **texture images** in particular.

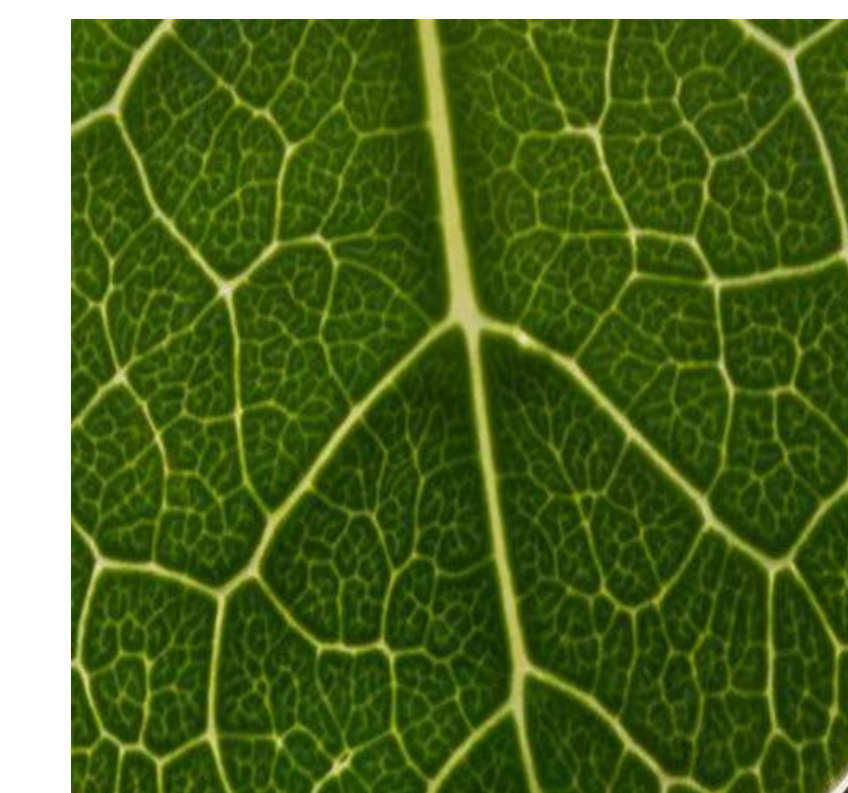
A New Texture and Natural Language Dataset

- **Goals:**
 1. Collect **natural language descriptions of texture-rich images** using Amazon Mechanical Turk, starting with DTD.
- **Collect 5 descriptions** per image
- **5,600+** images

Examples from our dataset:



“uneven black and brown splatches or splatters on layered crinkly brownish red material”



“White thin and large veins spread on a green surface in a net like pattern”



“white flower shapes, net like material, airy texture on a pink background with holes”

2. **Expand the original dataset** to include other texture-rich images in **other domains**, such as iMaterialist and DeepFashion.
3. **Evaluate** texture representation techniques on DTD and other texture-rich datasets.
4. **Describe textures** in new images with detailed natural language using convolutional and recurrent networks.
5. **Synthesize new textures** based on natural language descriptions using generative models.

Stay updated on our progress!

<https://mtimm100.github.io/texture.html>