Understanding Features

Goal

In this chapter, we will just try to understand what are features, why are they important, why corners are important etc.

Explanation

Most of you will have played the jigsaw puzzle games. You get a lot of small pieces of an image, where you need to assemble them correctly to form a big real image. **The question is, how you do it?** What about the projecting the same theory to a computer program so that computer can play jigsaw puzzles? If the computer can play jigsaw puzzles, why can't we give a lot of real-life images of a good natural scenery to computer and tell it to stitch all those images to a big single image? If the computer can stitch several natural images to one, what about giving a lot of pictures of a building or any structure and tell computer to create a 3D model out of it?

Well, the questions and imaginations continue. But it all depends on the most basic question: How do you play jigsaw puzzles? How do you arrange lots of scrambled image pieces into a big single image? How can you stitch a lot of natural images to a single image?

The answer is, we are looking for specific patterns or specific features which are unique, can be easily tracked and can be easily compared. If we go for a definition of such a feature, we may find it difficult to express it in words, but we know what they are. If someone asks you to point out one good feature which can be compared across several images, you can point out one. That is why even small children can simply play these games. We search for these features in an image, find them, look for the same features in other images and align them. That's it. (In jigsaw puzzle, we look more into continuity of different images). All these abilities are present in us inherently.

So our one basic question expands to more in number, but becomes more specific. **What are these features?**. (The answer should be understandable also to a computer.)

It is difficult to say how humans find these features. This is already programmed in our brain. But if we look deep into some pictures and search for different patterns, we will find something interesting. For example, take below image: