20180126 COGS 101b Lecture Notes

Cabinet COGS101b Lecture Notes

Perception

A sum of Sensory input and interpretation of those inputs.

Vision

Many shortcomings in Computer Vision because input is ambiguous

Inverse Projection Problem

The idea that the stimulus on the receptors is ambiguous - it could have been created by many different objects in the environment.

The 2D projection of the 3D world onto to the retina creates ambiguous signal as to *where* the projection came from.

Objects have infinite angles

Even though retinal objects can be different because of different angles, we still recognize them as coherent objects.

Objects Blurred and Occluded

Resolution

Even though the stimuls on the receptors is ambiguous, we only perceive a single agreed-upon object, not many possible realities

We recognize blurred objects, and that an occluded obect is not two objects

We have **viewpoint invariance**: we recognize an object regardless of our perspective.

Bottom-up Processing:

Processing based on the “raw data” - the information that reaches the sensory receptors.

Top-down Processing:

Using knowledge, models, ideas, expectations to interpret sensory information.

Unconscious Inference

The interaction between bottom-up and top-down processing.

1. Our perceptions are the result of unconscious assumptions, or inferences, that we make about the environment.
2. We perceive those objects and events that under normal circumstances would be *most* likely (top-down) to produce the received sensory stimulation (bottom-up).

Examples

- Shapes from shading, convex vs. concave.
- Blurred objects have different inferences based on context
- Ponzo illusion

Bayesian Inference

Raw retinal image – a lot of uncertainty about what caused this image, combined with prior experience, produces perception.

Not:

Sensory input → knowledge → perception

Word Superiority Effect

See Reicher 1969

- Flash a word
- Show two letters, where one of the letters was in the word above
- Now flash a letter
- Show two letters
- Conclusion: The letter was recognized more when the word was flashed instead of the letter.