DTU

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Computer Vision Exam Slides

Week 1: Homogeneous coordinates and pinhole model

Week 2: Camera model and homographies

Week 3: Multi-view geometry

Week 4: Camera calibration

Week 5: Nonlinear optimization and camera calibration

Week 6: Simple features

Week 7: Robust model fitting

Week 8: Transform invariant features

Week 9: Geometry constrained feature matching

Week 10: Image stitching

Week 11-12: Motion estimation

Week 13: Structured light

Equations

The ideal gas law is shown in .

$$p \cdot V = n \cdot R \cdot T \tag{1}$$

$$\frac{\partial}{\partial t} \int_0^{\delta} U dy = -\delta \frac{1}{\rho} \frac{\partial P}{\partial x} - U_f(t)^2 \tag{2}$$

More equations

$$\begin{aligned} CH_3COOH + OH^- \& &\rightleftharpoons CH_3COO^- + H_2O \\ H_2O \& &\rightleftharpoons H^+_{(aq)} + OH^-_{(aq)} \end{aligned} \tag{3}$$

$$f(x) \& = 1 + x - 3x^2 \tag{4}$$

$$g(x) + y \& = 3x - \frac{1}{2}x^3 \tag{5}$$

Probability I

Law of total probability for random variables

Let X, Y be random variables where x, y represent possible values, it holds that:

$$P(x) = \sum_{y} P(x, y) = \sum_{y} P(x|y) \cdot P(y)$$

Probability II

Bayes' theorem

- For any two events A and B in the sample space S, where $\mathbb{P}(B) \neq 0$, it holds that

$$\mathbb{P}(A|B) = \frac{\mathbb{P}(P|A) \cdot \mathbb{P}(A)}{\mathbb{P}(B)}$$

- Let $A_1, A_2, \ldots, A_K$ be a *partition* of the sample space S. Using the *law of total probability* for $\mathbb{P}(B)$, it then holds that:

$$\mathbb{P}(A_j|B) = \frac{\mathbb{P}(B|A_j) \cdot (\mathbb{A})}{\sum_k \mathbb{P}(B|A_k) \cdot \mathbb{P}(A_k)}$$

Generalising problem-solving by searching

So far we have only considered search problems in environments that are:

- **Single agent.** There is a single agent acting, the one we control.
- **Static.** When the agent is not acting, the world doesn't change.
- **Deterministic.** Every action has a unique outcome.
- **Fully observable.** The full state description is accesible to the agent.

Problem solving in the real world rarely satisfies these assumptions. Today, we will drop the assumption that the environment is deterministic and fully observable. We will also shortly consider generalising beyond single-agent and static environments.

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