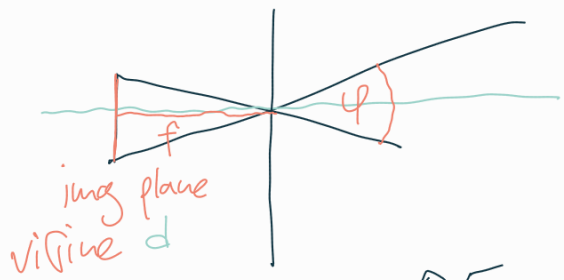
UZPFRI2025-10-06
meta: 6 obveznih dn, zagovori na vajah LE V PRAVEM TERMINU

- lahko spraševanje v slovenščini
- zagovore imamo lahko v slovenščini
- menjava terminov vaj se odpre tudi na moodlu.

NTSZZADISLEN

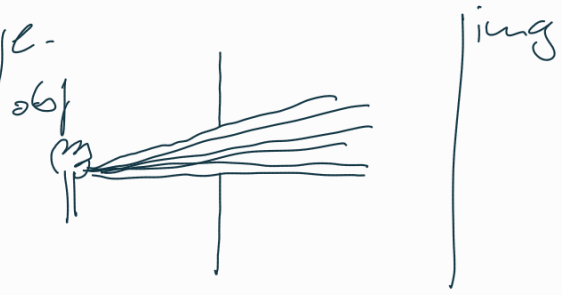
[Machine perception: intro]

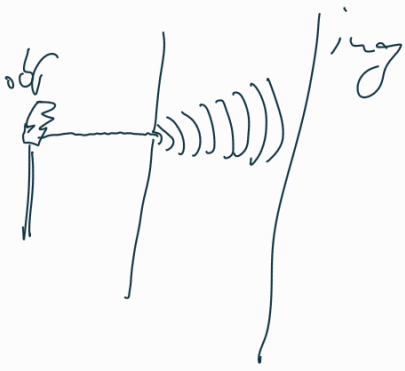
- camera obscura: FOV: premikanje image plane proti luknjici veča FOV in manjša focal length f in obratno $\varphi = \text{atan}\frac{d}{2f}$



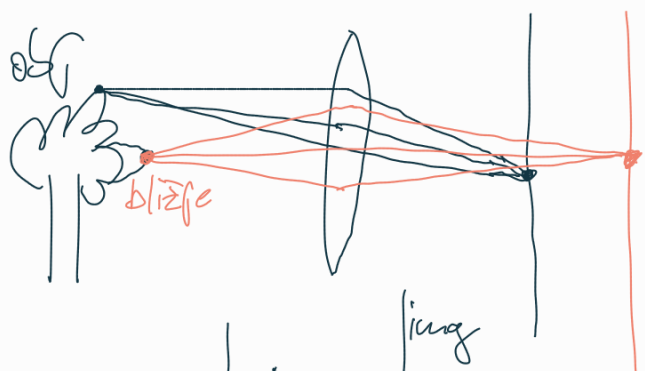
TEŽAVA CAMERE OBSCURE

- too wide aperture is bad because a point on an object creates a blured dist on the img plane (too many rays coming through)
- too narrow aperture is bad because it causes diffraction (uklon) -- luknjica postaja tako široka kot valovna dolžina svetlobe. pojeg tega se temne.





REŠITEV JE LEČA



REŠITEV JE APERTURA

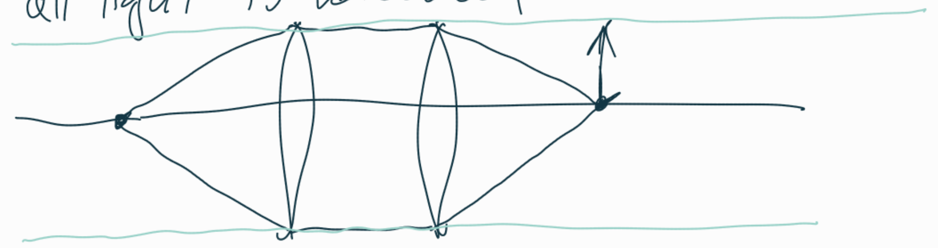
TEŽAVA: lom je različen pri različni valovni dolžini — barvi.

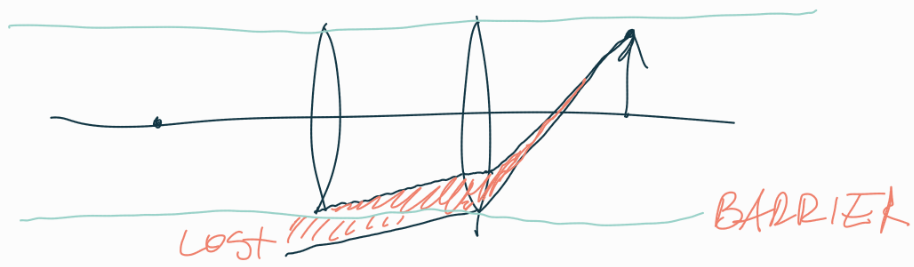
- problem se vidi na robovih slike (color bleeding), v centru pa ne, ker tam leča ne lomi svetlobe.

PROBLEM: sperical aberation: spherical lens ne fokusira svetlobe na vseh točkah enako.
treba je uporabiti tensi aspherical leče

PROBLEM: Vignetting (temna obroba slike)
problem pri več lečah

all light is refocused in centre





TEŽAVA: radial distorsion

zanimivo: leče v far-IR toplotnih kamerah so iz germanija. steklo namreč filtrira to.

teraherts žarki gredo skozi oblačila in se odbijejo od vode (mesa), a se upijejo v kovinah.

Digitalni senzorji:
- CCD ima buffer: dražji a brez rolling shutterja (read with FIFO)
- CMOS nima bufferja (ima column decode in row decode — tot SRAM) in je cenejši a z rolling shutterjem.

Q why not sample randomly to avoid rolling shutter (convert to blur) nisem vprašal

Q are there diffusors on those 2x2 bayer BGGR pixels? A: rarely, but sometimes

Q my camera says it's 1920x1080. does that mean

columns of 1920 2x2 bayer cells or 1920 single color pixels ?

A

[IMAGE PROCESSING]

slika je funkcija $I: [0, w-1] \times [0, h-1] \to [0, 255]^3$

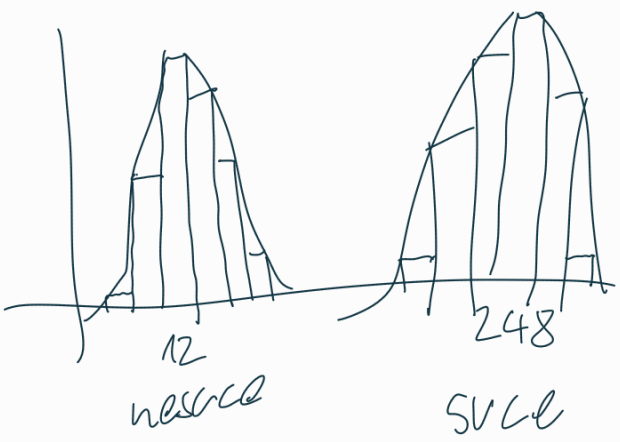
grayscale: $G: ([0, w-1] \times [0, h-1] \to [0, 255]^3) \to$
$[0, w-1] \times [0, h-1] \to [0, 255]$

predpis: $G(I) = [\frac{1}{3}\ \frac{1}{3}\ \frac{1}{3}]\ I$ (vecino)

binary image je $I: [0, w-1] \times [0, h-1] \to [0, 1]$

grayscale → binary.
uporabimo threshold ali classifier na posameznem pikslu v $\{0, 1\}$

avtomatsko iskanje thresholdov:
- navedi histogram barv na sliki



uporabi ne algoritem (glej prosojnice)

recimo Otsu 79

na predstavljeni metodi GHT: CVPR2020 Otsu's method generalized and is way better now, better than deep learning and also faster than all other single pass methods!