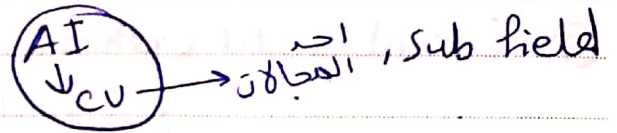


CV lecture notes Final

Lecture 1



- ① Reliable techniques for partial 3d model of environment from thousands of (Partially, (Intersection) (overlapping) imgs)
- ② large set of views → accurate dense 3d → ^{using} stereo matching
- ③ CV → ability of Computer to see
↓
AI system → process, perceive, reason visual data
≡ Image understand, machine vision, robot vision, Image Analysis
Video understanding
- ④ every image tell a story (picture is worth 1000 word)
CV → Perceive story behind picture
- ⑤ Common CV pipeline ^{Problem (app dependent)}
 - ① Image acquisition ② preprocessing ③ Segmentation
 - ④ Feature Detection, Selection → Most significant Feature
 - ⑤ high level processing ⑥ Decision making
- ⑥ CV → Enhancement images (Computational photography)
Forensics → طب الشرعي
- ⑦ Computer Graphics → Forward problem → In: description, out: ...
CV → Inverse problem → In: Img out: description of objects
- ⑧ modelling the visual world in all of its rich complexity is more difficult than modeling vocal tract that produces spoken sound

⑨ Forward model → physics (radiometry, optics, sensor design)
↳ Computer Graphics → not yet perfect

⑩ Inverse model → CV → reconstruct Images → shape, illumination, color distributions

⑪ ✓ Computer vision → Deep learning → Pattern Recognition
Pattern Recognition → Compression → Image processing?
Computer vision → AR/VR → Graphics, also

⑫ Graphics → In: description out: modeling
Image processing → In: Image output: enhanced image
CV → In: Image output: interpretation of objects

⑬ Problem of Computation vision → 3RS
Reconstruction, recognition, Reorganization

⑭ Formulate, Solve CV Problems
build ① Scientific → mathematical rules ③ Engineering → simple to describe, implement
noisy ② Statistical → probabilistic Test
④ Data driven → Collect representative set of test data
↳ labeled data = ground truth

⑮ Validate CV Algorithm
① Clean test ② Add noise ③ Real test

16) 3D modeling → Photogrammetry
Match move → CGI, track feature point
moCap / motion Capture → retro reflective marker (multiple cameras)
morphing → blending 2 photographs

17) 1970 → edges, get 3d
1980 → Image pyramid, Math, stereo
1990 → Camera Calibration, dense stereo
2000 → Feature Based
2010 → Data Parallel algorithms