CSCE-5683
Digital Image Processing

Class Overview

Spring 2026

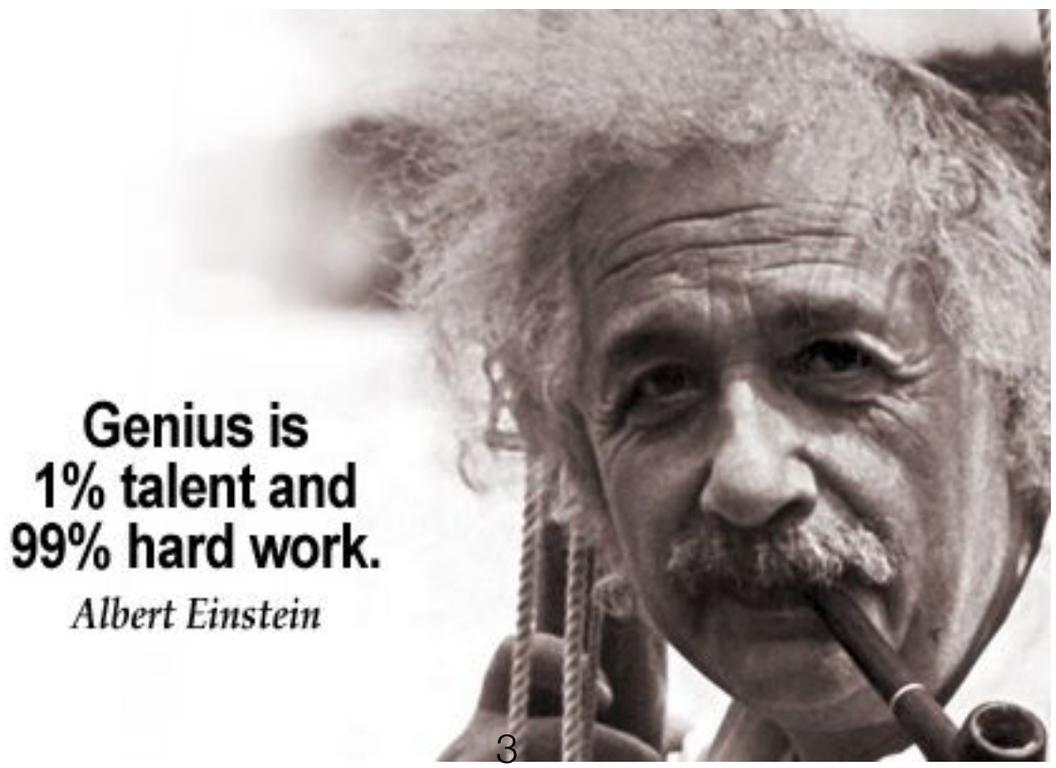
Prof. Khoa Luu
khoaluu@uark.edu

Reading
Textbook - Research Papers

a lot of reading
a lot of questions
a lot of discussion

Assignments - Projects

a lot of programming
hours and hours of programming
days and days of debugging



Class Info

- Instructor: Prof. Khoa Luu (https://uark-cviu.github.io/)
- Email: khoaluu@uark.edu
- Time: Tuesdays, Thursdays, 9:30 A.M - 10:45 A.M
- Place: JBHT 239
- Office hours: Tuesdays, 12:00 P.M - 1:00 P.M
- Office Location: JBHT - Room 521

Class Info

- Co-Instructor: Dr. Thanh-Dat Truong (https://truongthanhdat.github.io/)
- Email: tt032@uark.edu
- Office Location: JBHT - Room 348

Class Info

- Course website:

  https://uark-cviu.github.io/classes/csce5683/
  (available from this Thursday)

Course Requirements

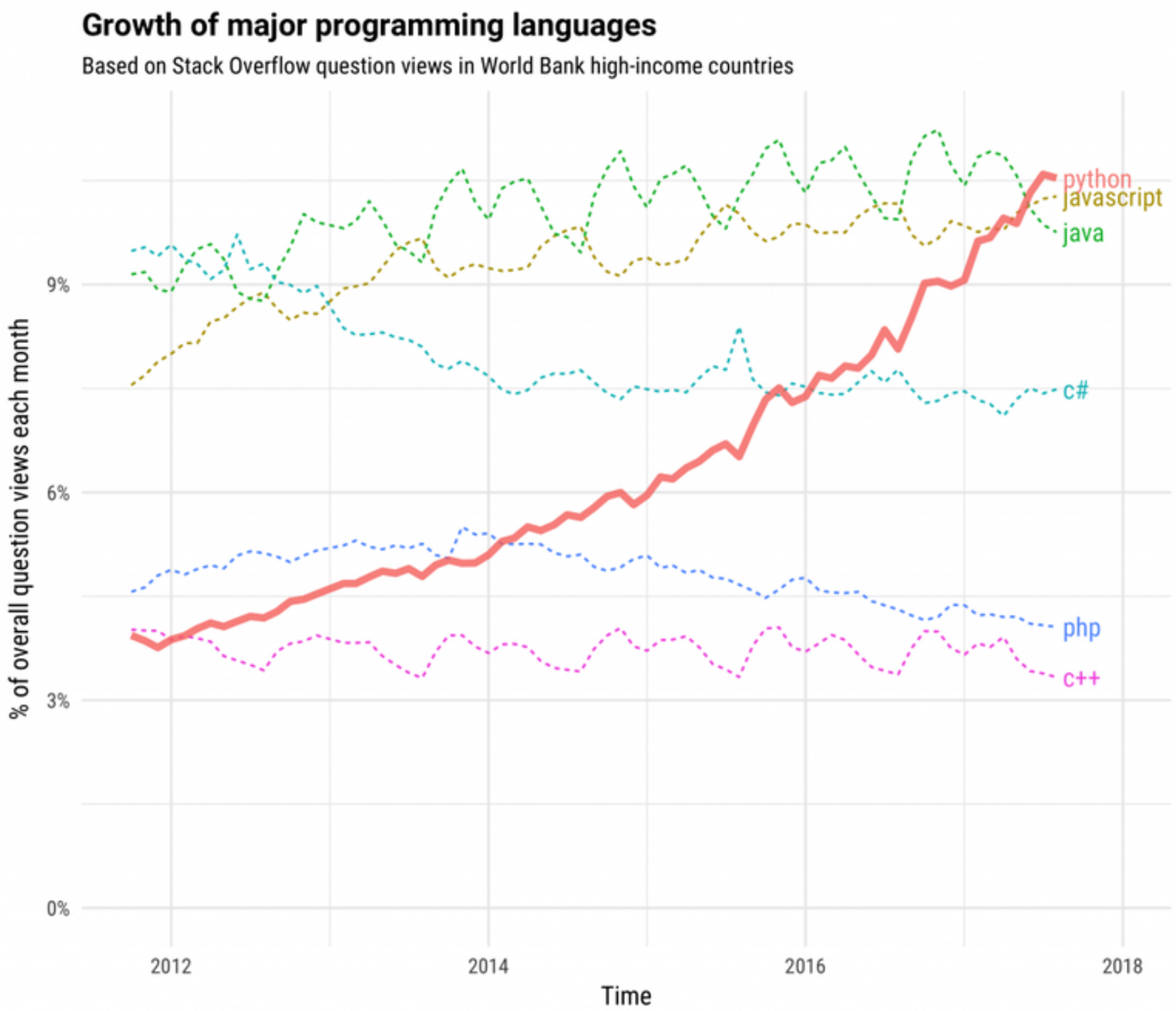
- Homework (individual/group): 4-5 (tentative)
- Midterm Exam
- Final Project (Presentation + Program + Report)
- Bonus Project
  (Selected State-of-the-art competitions in the field - encourage students to join!)
- Reports: NeurIPS template (Latex or MS Words)

Programming Languages

Any, but prefer:

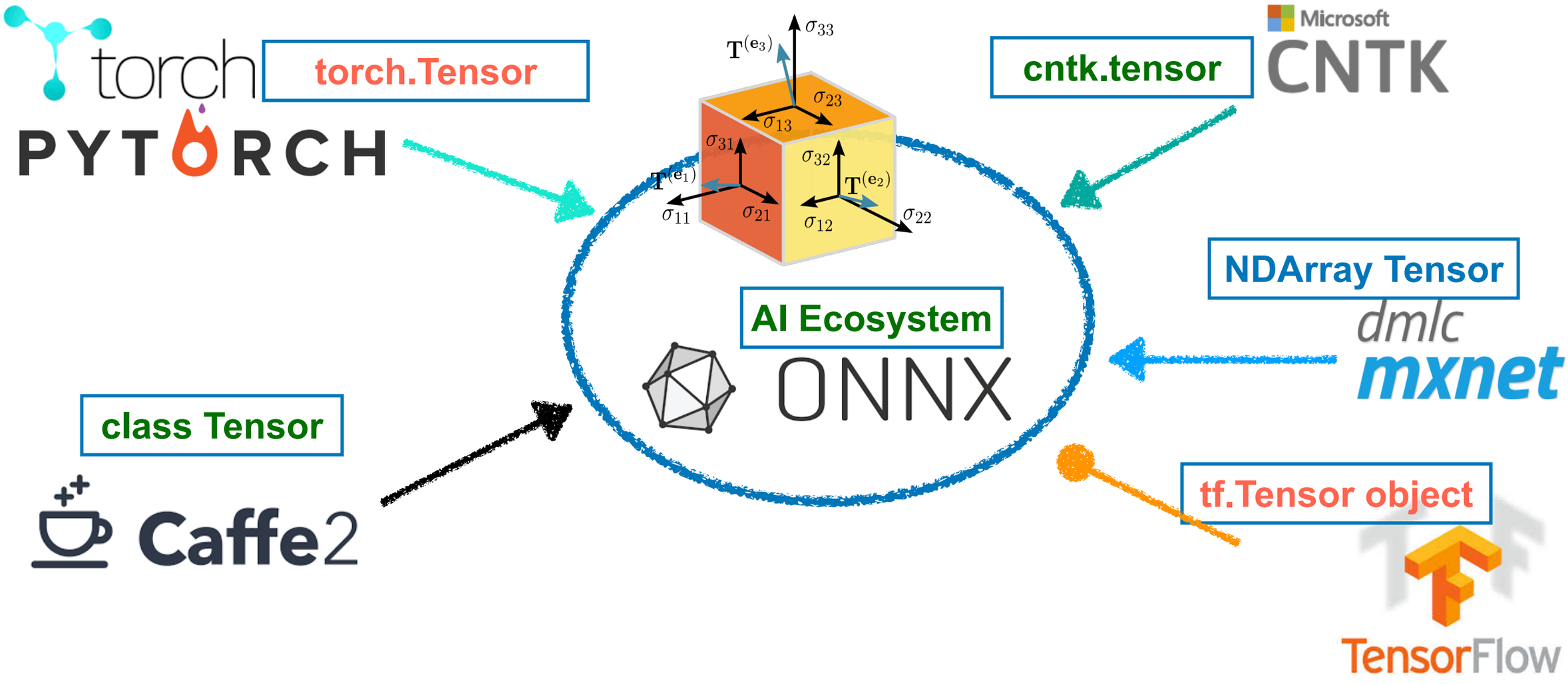
- Python (Highly recommend)
- C/C++ (OpenCV)
- Matlab

Programming Languages



Deep Learning Framework - Python

- Most recent Deep Learning Frameworks (Computer Vision and Image Processing) fully support Python



Sarah Bird, Dmytro Dzhulgakov. "Announcing ONNX 1.0 – An open ecosystem for AI." *Microsoft, Facebook, Amazon*, December 2017.

Grading

- Assignments: 30%
- Midterm Exam: 20%
- Final Project: 50%
- Bonus: 20%

Approach

- Grading based on absolute scale
- Getting an A v.s mastering the materials
- Take advantage of extra credits
- Build your resume with meaningful project experience

Late Days

- 5 late days in total
- 3 days per assignment/project maximum use
- Use them wisely (save them for final project!)

Course Materials

- Check the website frequently
- Update forum discussions (Be active)
- Use office hours

Course Materials

	Topics	Note
	Introduction and Basic	
	Class Overview, Introduction 1	
	Introduction 2	
	Basic Operations 1	
	Basic Operations 2	HW1
	Spatial Domain Processing	
	Intensity Transformation	
	Histogram Operations	
	Spatial Filtering 1	
	Spatial Filtering 2	
	Convolutional Neural Network	HW2

Course Materials

	Topics	Note
	Frequency Domain Processing	
	Fourier Transform - 2D Fourier Transform	
	Fast Fourier Transform	
	Frequency Filtering 1	
	Frequency Filtering 2	
	Wavelet Transform	
	Correlation Filter	HW3
	Color Image Processing	
	Color Image Processing 1	
	Color Image Processing 2	
	Image Colorization - Advanced Topic	
	Texture Transformation - Advanced Topic	HW4

Course Materials

	Topics	Note
	Image Enhancement	
	Image Restoration 1	
	Image Restoration 2	
	Image Denoising 1	
	Image Denoising 2	
	Image Deblurring	HW5
	Image Feature Extraction	
	Feature Extraction 1 - SIFT	
	Feature Extraction 2 - HOG	Midterm Exam
	Feature Extraction 3 - LBP	
	Feature Extraction 4 - Recent Methods	

Course Materials

	Topics	Note
	Image Understanding	
	Hough Transform	
	Edge Detection 1	
	Edge Detection 2	
	Harris Corner Detector	
	Object Detection 1 (Haar Feature)	
	Object Det. 2 (Faster RCNN, YOLO, Transformer)	
	Object Recognition 1	
	Object Recognition 2	
	Object Segmentation 1 (Level Set)	
	Object Segmentation 2 (Mask-RCNN, SAM)	
	Image Modeling	
	Image Modeling 1	Final Project
	Image Modeling 2	
	Image Compression 1	
	Image Compression 2	
	Infrared Image Processing 1	
	Infrared Image Processing 2	
	Review	
	Final Project Presentation	Presentation & Poster

Textbook

- Digital Image Processing (3rd & 4th Editions): Rafael C. Gonzalez, Richard E. Woods

- Research Papers (Check website)