

Syllabus [2025Year 2 Term]

Course Information

Course Title	Introduction to Computer Vision	Credits	3
Course Code	472670-1	Required/Elective (For Undergraduate Courses)	Selective majors
Department or Major	Department of Mobile Systems Engineering	Language	English
Methods of Teaching		Lecture Room	월4,5,6(국제210)/ 화1,2,3(국제506)
Time Allotment	Lecture(3) Experiments(0) Trainging & Practice(0) Performance(0) Designing & Planning(0)	Cyber Lectures	
Course Type	offline		
Cyber Lectures Preview			

Lecturer

Lecturer	Name	JaeYeon Park	Rank	Assistant Professor	Final Academic Degree	공학박사
	Department & college	Department of Mobile Systems Engineering		Office		
	Office Phone Number	—		e-mail	jaeyeon.park@dankook.ac.kr	
	Field of Interest					

Course Summary

Course Description	This course provides a comprehensive overview of Computer Vision, ranging from foundational concepts to recent advancements in the field. It begins with traditional image processing techniques (e.g., OpenCV, SIFT, HOG) and progresses through the development of deep learning-based methods, including CNN-based image classification, object detection, semantic and instance segmentation, video recognition, image generation and restoration, and attention-based models such as Transformers and Vision Transformers (ViT). In addition, students will explore practical techniques for lightweight model deployment (e.g., MobileNet, EfficientNet) and learn about state-of-the-art models such as Segment Anything and DINOv2. The course emphasizes both theoretical understanding and hands-on application, preparing students for real-world problem solving and future research.
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Description Related Courses	<p>(Strongly Recommended) Basic Mathematics / Linear Algebra: Essential for understanding convolutional operations, matrix computations, and dimensionality reduction techniques in vision models.</p> <p>(Strongly Recommended) Machine Learning: Provides core concepts such as supervised learning, optimization, and generalization, which directly support the understanding of vision techniques.</p>
Course Goals	<p>[Knowledge Application] Understand and apply both classical image processing methods and modern deep learning-based computer vision models to real-world problems.</p> <p>[Creative Problem Solving] Select or design suitable vision models under various constraints (e.g., mobile or real-time environments) and propose novel structures if needed.</p> <p>[Logical Reasoning] Analyze model architecture and performance, interpret experimental results, and engage in data-driven decision-making using critical thinking skills.</p>
Projected Results	<p>Balance of Theory and Practice: Students will gain the ability to implement core computer vision tasks such as classification, detection, segmentation, and generation, while understanding the theory behind them.</p> <p>Analytical and Comparative Skills: Students will be able to critically compare various computer vision models, evaluate their effectiveness, and make logical, evidence-based conclusions.</p> <p>Awareness of State-of-the-Art Technologies: By studying models like Vision Transformers and mobile-efficient networks, students will acquire knowledge relevant to cutting-edge industry practices.</p> <p>Project-Driven Extensions: The course is structured to provide a solid foundation for capstone projects, industry-academic collaborations, and research presentations.</p>
Percentage of the original language classes(%)	
Cyber Lectures Preview	

Syllabus

Times	Lecture Topic	Lecture Goals	Lecture Methods	Assignments
1	Orientation & Introduction to Computer Vision	Course overview, history of computer vision, traditional techniques vs deep learning techniques	강의,	
2	Fundamentals of Image Classification	Emergence of CNNs, automatic feature extraction from images	강의,	
3	Advances in Deep Neural Network Architectures	Depth, parameter size, performance trade-offs, parameter efficiency	강의,	
4	Extension of Deep Networks with Residual Learning	Vanishing gradient problem, concept of		

Times	Lecture Topic	Lecture Goals	Lecture Methods	Assignments
		skip connection		
5	Object Detection	Classification vs Detection, anchor boxes, ROI	강의,	
6	Semantic / Instance Segmentation	Pixel-wise classification, difference between object and instance	강의,	
7	Image Generation & Restoration	Autoencoder, denoising, inpainting techniques	강의,	
8	Midterm Exam			
9	Video Recognition	Temporal information processing, sequential frame handling	강의,	
10	Attention Mechanisms and Self-Attention	Limitations of CNNs, introduction of attention mechanisms	강의,	
11	Vision Transformer (ViT) Concepts	Patch embedding, position encoding	강의,	
12	Hybrid Models: CNN + Transformer	Integration of CNNs and Transformers, efficiency comparison	강의,	
13	Lightweight Models and Real-Time Vision	Model compression for mobile/embedded environments	강의,	
14	Recent Trends	Introduction to SOTA models, paper reviews, industrial applications, Video-based Latest Technologies Study	강의, 디지털·AI교육,	
15	Final Exam			

Methods of Grading

sequence	Description	Percentage	Details
1	Mid-tem Exam	30%	
2	Final-exam	35%	
3	Pop Quizzes	0%	
4	Assignments	20%	
All		100%	

sequence	Description	Percentage	Details
5	Reports	0%	
6	Presentations & Discussions	0%	
7	Attendance	15%	
8		0%	
9	Others	0%	
All		100%	

Core of Value

핵심가치	전공역량	역량정의	역량구분	값(%)
혁신 (Discovery)	창의적문제해결 (Creative problem-solving)	주어진 상황과 문제를 창의적으로 해결할 수 있는 능력	부역량	20%
혁신 (Discovery)	도전 (Challenging)	전공 지식을 새로운 분야와 융합하고 아우를 수 있는 능력		0%
혁신 (Discovery)	지식융합 (Knowledge convergence)	새로운 분야를 개척하거나 도전적으로 임할 수 있는 능력		0%
헌신 (Dedication)	세계시민 (Universal value)	세계 공동체 구성원으로 전공자로서 국제적 이슈에 대응할 수 있는 능력		0%
헌신 (Dedication)	상호협력 (Cooperation)	공동의 목적 달성을 위해 타인과 상호협력을 할 수 있는 능력		0%
헌신 (Dedication)	공동체 (Sense of community)	공동체의 구성원으로서 필요한 태도와 윤리의식을 가질 수 있는 능력		0%
능동 (self-Determination)	자기주도 (Self-Managing)	주어진 상황과 문제를 주도적이고 능동적으로 해결할 수 있는 능력		0%
능동 (self-Determination)	지식활용 (Knowledge application)	주어진 상황과 문제에 대해 논리적으로 파악하고 분석할 수 있는 능력	부역량	30%
능동 (self-Determination)	논리적사고 (Logical thinking)	전공관련 지식을 필요에 따라 다양하게 적용하고 활용할 수 있는 능력	주역량	50%

핵심가치	전공역량	역량정의	역량구분	값(%)
능동 (self-Determination)	의사소통 (Articulation)	대화를 통해 다양한 의견을 조율하고 합 의를 이끌어 낼 수 있 는 능력		0%

Textbook(s) & References

Descrip tion	Title	Author	Publisher
Requi red T extbo ok	Computer Vision: Algorithms and Applicatio ns, 2nd ed.	Richard Szeliski	Springer

Memo