



Computer Vision Syllabus

Earn confidence to solve real-world problems using computer vision

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Office Hours: To be announced

Classes: Monday and Wednesday - 17:30 - 19:30

Start date: 02 March 2020

End Date: 01 April 2020

I. What to expect from the course:

Mission

Our mission with this course is to offer you a solid foundation in the subject of computer vision, develop your confidence to solve real-world problems, your curiosity to keep improving and to connect your talent with exciting jobs in the industry.

Educational objectives

In this program, you will develop a strong foundation, both theoretical and practical, of computer vision. With the knowledge acquired here, you will be able to understand what computer vision is, how it is used to perform pattern recognition, image classification, and object tracking. You will have hands-on experience with the latest deep learning architectures used in the industry today to power computer vision, understand the most cutting-edge research papers on the subject, have the opportunity to work in exciting projects and to present your results to industry experts, who will give you valuable feedback.

II. Format and Procedures:

The computer vision course is presential and will take place in Sebratec academy's headquarters. The total duration is **5 weeks**, and you will have **2 classes** per week, which will be **2 hours** long each. Expect to have a high volume of laboratory classes, because this course is intended to provide you as much hands-on experience as possible. You will discuss cutting edge research material and develop your own computer vision systems during our laboratory sessions.

Minimum attendance is mandatory, and you need to be present in at least 75% of the classes in order to graduate. You will also be required to submit, and be approved in a practical project to graduate. A graduation ceremony will be held at the end of the course, where we will invite industry experts to attend. If your project is approved, you will have the chance to present it to a board of industry experts to get valuable feedback from them, and even build your professional network.

III. Course Requirements:

In order to succeed in this program and to make the most of it, we **require** that candidates have significant experience with a programming language, preferably Python, and deep learning architectures. You should be able to read, write and document code for other people to read should be familiar with the term "Neural Networks", and have entry-level knowledge about it. We also **recommend** that candidates have entry-level knowledge with linear algebra.

You will not be required to buy any extra material during the progress of this course. Laptops will be offered during the laboratory sessions and all of the practical exercises will be supplied by Sebratec.

IV. Grading Procedures

You will have several laboratory sessions along the course. These laboratories will not be graded, but they will serve to measure your learning and to give you personalized feedback as the course goes on.

However, at the end of the course, you will be required to deliver a project in order to graduate. We expect you to work on this project as the course goes on, and to submit it several times to receive feedback from the teacher until you receive an approval.

Each time you submit your project, the teacher will evaluate your work, provide feedback on what you have done and request improvements, or approve your project. Your project must be approved before the deadline for you to be eligible to submit it for the graduation committee.

Once submitted to the committee, the project must be presented in no more than 10 minutes. The committee may have people outside of Sebratec Academy. After the presentation, the project will be evaluated by the committee, and you must be approved in order to graduate.

The deadlines will be announced during the course, and projects submitted after the deadline will not be evaluated.

V. Code of conduct

By enrolling in the course, you agree to abide by the following code of conduct. Students found to be acting in violation of the terms set forth may be asked to leave their program without a refund. You also agree to our Terms of Use, and, if you participate in any of our communities, the Community Code of Conduct. You further understand and agree that all decisions regarding participation, graduation, and awarding of verified certificates will be made by Sebratec Academy in its sole discretion.

You are also expected to:

- Not harass other students, visits, or members of the staff;
- When attending classes, not being late for more than 15 minutes;
- Not disturb the classes. Every student has the same right to study as you do;
- Respect the property of Sebratec Academy. That includes, but is not limited to, computers, materials, chairs, office and etc;
- Not cheat in the graded exams. Cheating is considered a very serious offense, and can result in a permanent ban from Sebratec academy;
- Not bring to class, or be in the influence of alcohol, drugs;

Refusal to comply with the code of conduct can result in a warning, removal from the classroom, cancellation of your contract, or a permanent ban from studying in Sebratec Academy.

VI. Community code of conduct

We understand that our members represent a rich variety of backgrounds and perspectives. Sebratec Academy is committed to providing an atmosphere for learning that respects diversity. While working together to build this community we ask all members to:

- Share their unique experiences, values, and beliefs;
- Be open to the views of others;
- Honor the uniqueness of their colleagues;
- Value each other's opinions and communicate in a respectful manner;

VII. Course Schedule

(May change to accommodate guest presenters & student needs)

Schedule	Topics	Learning outcomes	Assignment
Week 1 - 2nd and 4th March 2020	Welcome, introduction, and simple convolutional neural networks	In the first session, you will meet your peers and teacher, understand what computer vision is, the history of computer vision and how it is changing the world. You will also be introduced to the math behind convolutions, convolutional layers, pooling layers, and deconvolutions. In the second session, you will have a hands-on laboratory class implementing a convolutional neural network yourself.	Lab: Simple convolutional neural networks
Week 2 - 9th and 11th March 2020	Image classification and transfer learning	In the third session, you will learn about image classification, object detection and segmentation, inception layers and transfer learning. In the fourth session, you will have a hands-on laboratory class to put into practice what you have learned in session three. Here, you will build a convolutional neural network, apply transfer learning to it, and use it to classify images.	Lab: Build a convolutional neural network, apply transfer learning to it, and use it to classify images

Week 3 16th and 18th March 2020	Object segmentation, detection, U-Net, and generative adversarial networks	<p>In the fifth session, you will have a hands-on laboratory class where you will perform object detection and segmentation.</p> <p>In the sixth session, you will learn about the U-net and generative adversarial networks.</p>	Lab: Object detection and segmentation
Week 4 23th and 25th March 2020	U-Net, autoencoders and generative adversarial networks	<p>In the seventh session, you will have a hands-on laboratory class about the U-net and how to apply autoencoders to your computer vision models.</p> <p>In the eighth session, you will have a laboratory session focused on generative adversarial networks and their applications in real life.</p>	<p>Lab: U-net and autoencoders</p> <p>Lab: Generative adversarial networks</p>
Week 5 30th March 2020 and 1st April 2020	Final project	This final week is dedicated to project reviews, office hours and orientation. You must submit your project before the deadline.	Project submission
Week 6 To be announced	Graduation		

VIII. Bibliography

Chollet, François. *Deep Learning With Python*. Manning publications, 2017.

Rosebrock, Adrian. *Learning for Computer Vision with Python*. Self-published, 2018.