6 Questions About Computer Vision Jobs

1. How do I break into the computer vision industry?

Computer vision and related fields in AI are so fast-moving. Find opportunities by staying on top of new developments.

We recommend a 3-part strategy to finding opportunities in computer vision.

1. **Stay updated on thought leadership.** Start every morning reading a 10-minute blog post on Medium or by scrolling your Twitter feed. Authors tend to link to larger research papers for further insights and learnings.
2. **See how computer vision fits into common image analysis and machine learning roles**, ranging from researcher to image analyst to software engineer. Do job searches based on skills (such as feature extraction or SLAM), rather than job title. You will find more opportunities.
3. **Create your own computer vision application and share it!** Job seekers ask Udacity Careers all the time on how to talk about their skills and experiences - better than talking is showing. Develop your own app or product (it can be a small, personal project!), put the work online (ie: upload your code on GitHub), and then write a blog post documenting the development process and purpose of the project. You can pursue both software and hardware projects.
    - Software ideas: Demonstrate basic image processing skills or proficiency with OpenCV. Run deep learning models with AWS Deeplens. You can also get inspired by what other people are doing -

right now on Medium, many people are blogging about their TensorFlowprojects.

- Hardware ideas: Raspberry Pi models are small and affordable and Google released the AIY Vision Kit in 2017. Share what you create by writing a blog about the experience and become a part of the larger community by hashtagging #AIYProjects.

2. What are the key knowledge/skills that are useful to work on computer vision as an engineer?

In the Computer Vision Nanodegree program, you will gain insights into and practice these core computer vision skills:

- Implement image processing techniques like color and geometric transforms
- Create and apply convolutional filters to images to smooth them or detect object edges
- Apply feature extraction methods like Histogram of Oriented Gradients (HOG) and ORB to detect features like the eyes and mouth on a face
- Implement k-means clustering and contour detection to find areas with similar traits in an image
- Define and train a convolutional neural network (CNN) to classify different items of clothing
- Build a CNN that aims to solve a regression task: detecting facial keypoints; this skill can be extended to the task of emotion recognition
- Explore how region-based CNNs and formulations like YOLO lead to faster object recognition

- Define and train a recurrent neural network (RNN) to process and generate sequences of text
- Use long short-term memory cells to create an RNN that can produce captions given an image feature vector
- Train your own algorithmic models to predict and understand visual scenes
- Use methods like optical flow and Bayesian filters to track an object's motion
- Use SLAM to simultaneously localize an autonomous vehicle and create a map of the landmarks that surround it using only sensor measurements, collected over time

To become a better job candidate, dive deeper into the follow concepts, beyond the Nanodegree program.

- Knowledge of or applications in deep learning and neural networks [learning resource - not Udacity]
- Programming competency in C++ (a useful language for working with hardware). Find C++ programming lessons in the Extracurricular section of your Nanodegree Classroom!
- Simultaneous Location and Mapping (SLAM)
- PyTorch and/or TensorFlow

Although the above is by no means an exhaustive list, taking the time to pick up any of these these technologies will only strengthen your chances of moving forward in an application process.

3. Could I apply for deep learning jobs?

Companies investing in cutting-edge technologies often look for candidates with both deep learning and computer vision knowledge. For example, Athelas uses computer vision with deep learning to count white blood cells.

A deep learning engineer may be asked to focus on designing and changing the architecture of a CNN or RNN so that it is optimized for training for a variety of tasks, such as voice recognition or generating fake images. Computer vision and deep learning engineers tend to focus on deep learning as it is applied to feature extraction and object recognition with a CNN; some tasks and skills that fall in both realms are pre-processing image data, and training a CNN to detect meaningful visual features. A computer vision & deep learning engineer is expected to work with visual data like images, video, and LiDAR point clouds (laser data).

4. What are some job titles in computer vision?

Tip: Remember that there are so many roles available related to computer vision. Instead of searching for job titles, consider finding top AI startups and companies and looking at their overall jobs page.

Many companies, when advertising for roles requiring computer vision skills, use substitute terms. You may find these terms in job postings, rather than "computer vision" itself. Remember to read the job listing carefully. Common key terms akin to computer vision are:

- Image Recognition
- 3D Image Analysis
- Image Processing

- Deep Learning

Here are **common titles** of jobs in computer vision:

- Machine Learning Engineer
- Image Processing Engineer
- Computer Vision Engineer
- Researcher, Computer Vision
- Machine Learning Researcher, Computer Vision
- Applied Research Scientist
- AI Vision Image Processing Engineer
- Software Engineer, Vision
- Data Scientist
- Deep Learning Engineer - Computer Vision

5. What do typical computer vision engineers do in their day-to-day?

Although you will find jobs, especially in Silicon Valley, labelled "computer vision engineer", you are most likely to find other roles (such as "applied researcher" or "data scientist") that ask for computer vision skills. Do Boolean searches that combine some of your background with computer vision skills. Many smaller companies not yet established in the AI field may be looking for a generalist first, to pave the way for their data team.

Some common work duties you will find in job postings are:

- Design and build machine intelligence features

- Develop machine learning algorithms related to computer vision, such as object detection/recognition and image retrieval
- Deploy analytics models in production and evaluating their scalability
- Code in C++ and Python
- Collaborate with other data and engineering teams on hardware, software architecture hardware and quality assurance
- Improve deep-learning-based image segmentation and object detection pipelines
- Identify core requirements for camera sensors

6. Okay, I know all of this now. What should I do next?

Right now, you are learning the foundational skills for a career in computer vision. Focus on your learning, and imagine yourself in different roles. We recommend performing a job search to see what's out there.

We'll help you get started. We searched for "computer vision" jobs worldwide on LinkedIn. Click the button below to see the search results. Change your search terms and apply filters. Once you have an idea of which jobs or companies you may be interested in, read about the companies or find personal blogs by people working in those roles. You can even reach out to people for informational interviews.

GO TO LINKEDIN SEARCH

After you spend some time looking at various jobs available to you, come back to the Classroom to continue.

Real-World Applications of Computer Vision

From health applications to the autonomous vehicle space to sign language translation for the deaf and hard of hearing, computer vision skills are needed in a variety of fields. Here are just a few examples:

Hand Recognition

Before learning how to train machines to identify objects in space in real time, it's important to understand how still images are analyzed and recognized. For example, in Lesson 4: Types of Features and Image Segmentation, you'll learn about a technique called contouring, which is used in hand recognition programs. Hand recognition is a widely-recognized way of facilitating HCI (human-computer interaction), which is used in a variety of ways from mobile applications to gestural interpretation, so the foundational knowledge of not just how to program it, but how it works, is critical for those who may be looking to pursue a career in computer vision.

Then, you can take these skills and eventually teach a computer algorithm to track hand gestures in real time. A quick search on Youtube will turn up many interesting examples of how hand recognition can help with language processing, augmented reality, and even the creation of abstract art!

Self-Driving Cars and Spatially Coherent Data

Computer vision is used for vehicle and pedestrian recognition and tracking (to determine their speed and predict movement). Check out this blog from David Silver on how computer vision works for self-driving cars.

Medical Image Analysis and Diagnosis

In addition to founding Udacity and starting the Google X and Self-Driving Car labs at Google, Sebastian Thrun is also a professor of computer science and an extensively published artificial intelligence scientist. In early 2017, his team at Stanford produced a report on how deep learning--which is tied intrinsically with computer vision--can be used to identify different types of skin cancers at an accuracy level comparable to that of dermatologists.

In the Extracurricular section of your classroom, you'll find a course taught by Sebastian himself that takes you through the research his team did to identify melanoma lesions, and what implications this research has for the future of medicine. The course material should take you between two and three hours, and at the conclusion, you'll have the opportunity to write an implementation of your own.

While you technically don't need to take the course to graduate, understanding and being able to discuss applications of computer vision in the real world can really impress a hiring manager during your interview or technical interview. It can also open the door to job opportunities in tech-adjacent fields--in this case, medical technology.

Up Next

By now, you have made progress in your Nanodegree program and gotten an overview of jobs in computer vision. You should feel comfortable seeking out information online to further your knowledge of the community and new developments in the field. You should also know how to find computer vision and related jobs on job boards.

Continue on in the lesson to learn how to leverage Udacity Career Services in your career development.