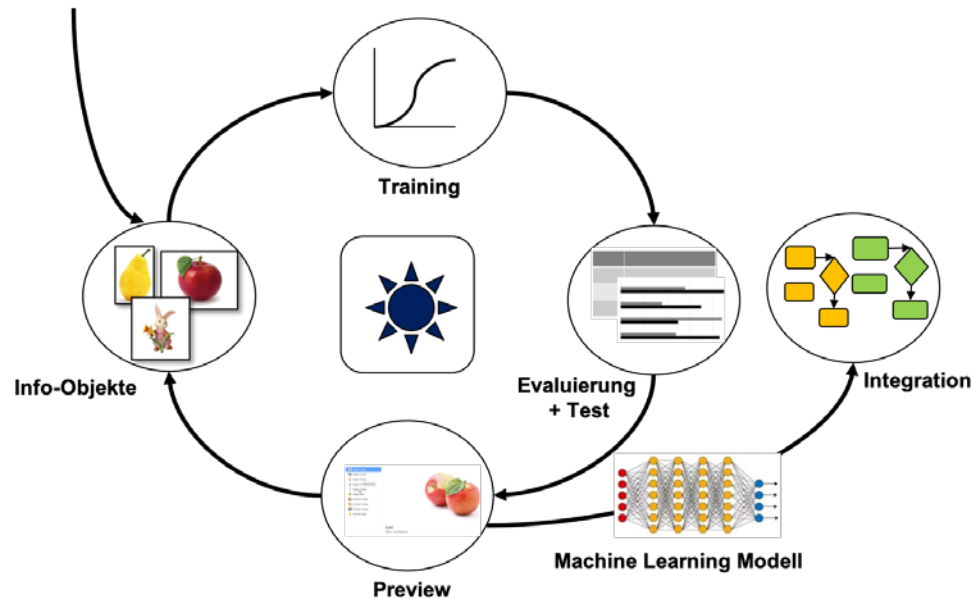


Einbindung und Anwendung von Algorithmen Künstlicher Intelligenz bei der iOS-App-Entwicklung mit Create ML



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Hochschule Ansbach

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Treiber und Enabler des KI-Hypes

- **Steigende Rechnerleistungen** machen KI auch auf Endgeräten möglich.
 - Stichwort „**On Device Machine Learning**“.
- **Wachsende Mengen an Informationen** erfordern zahlreiche automatisierte Anwendungen zu ihrer Auswertung und Nutzung, etwa durch Machine Learning.
- **Geeignete Werkzeuge** sind der Schlüssel zur Realisierung zahlreicher und vielfältiger Ideen.

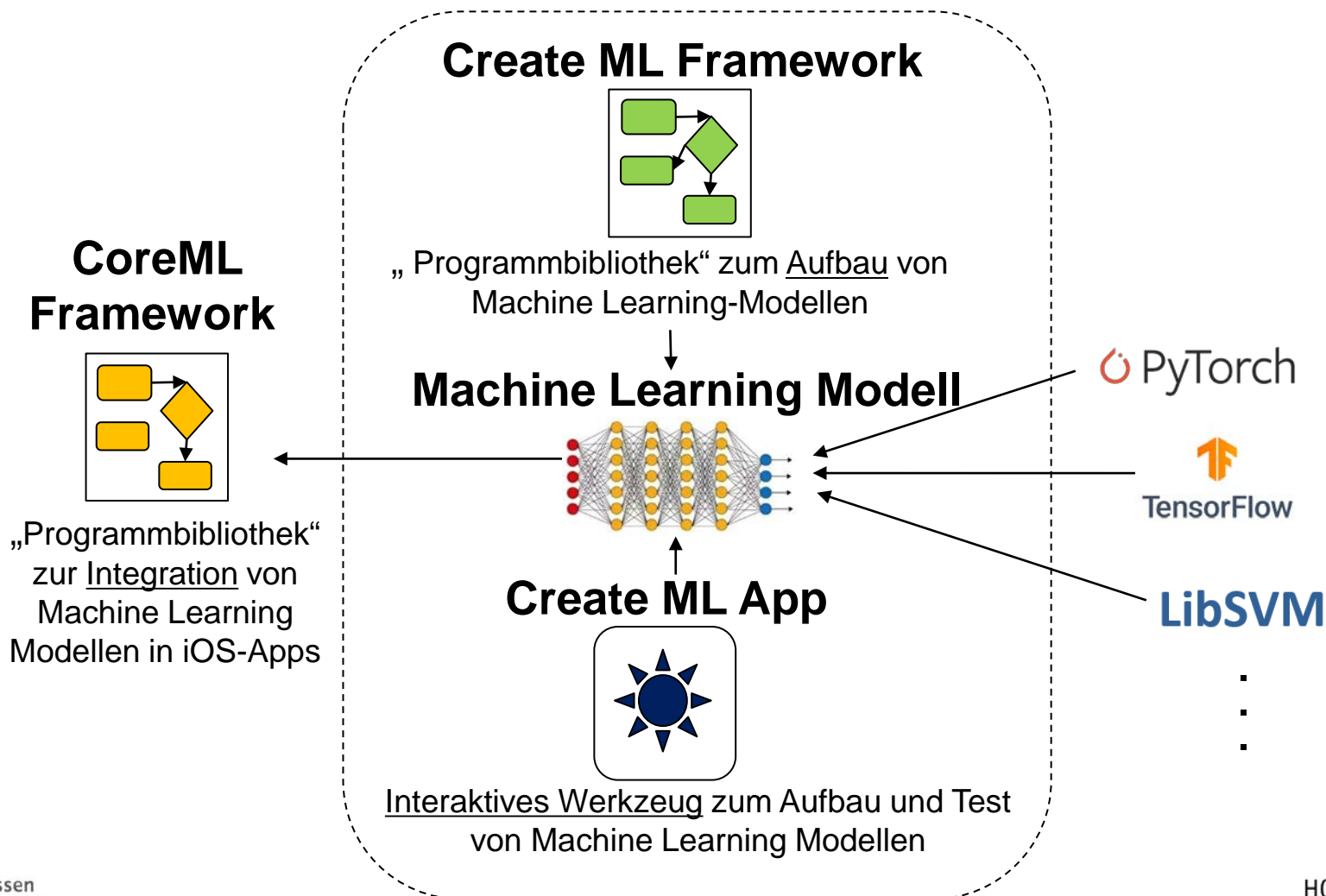


Quelle: Shutterstock.com



Quelle: Shutterstock.com

Was ist Create ML?



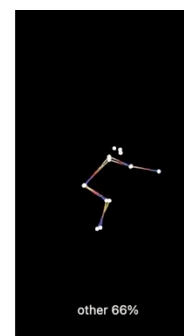
Was bietet Create ML?

Interaktives Training, Bewertung und Test von Modellen für verschiedenste Informationsobjekte (Auszug):

Informationsobjekt	Modelltyp
Bild	Image Classification, Object detection, Hand pose Classification
Video	Action Classification, Hand Action Classification
Bewegungen	Activity Classification
Ton	Sound Classification
Text	Text Classification, Word tagging
Tabellen	Tabular Classification, Table regression



Bildquelle: WWDC2020b



other 66%

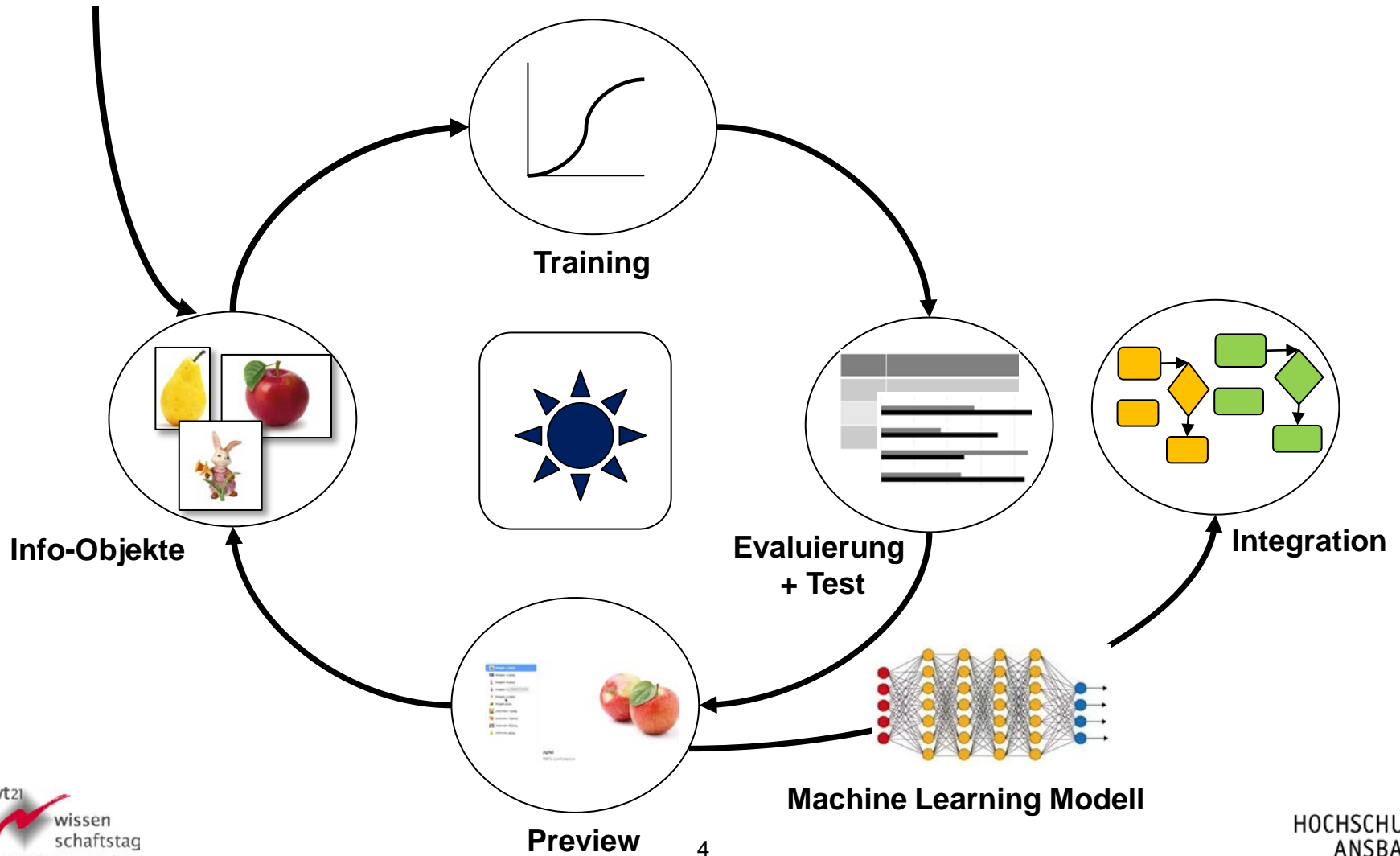


squats 56%

Bildquelle: WWDC2020b

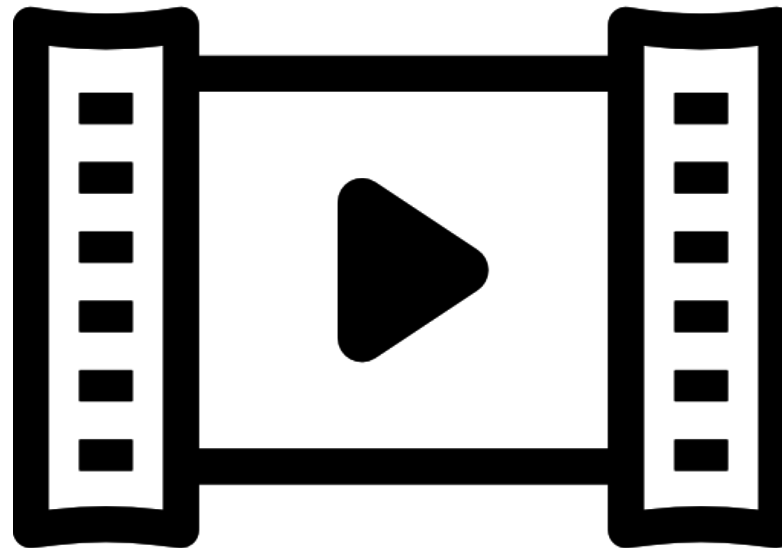
Quelle: AppleDeveloper (2021)

Create ML Workflow



Video-Demo

Aufbau eines Machine Learning-Modells zur Bildklassifikation



Bildquelle: Freepik.com



**Vielen Dank
für die
Aufmerksamkeit!**



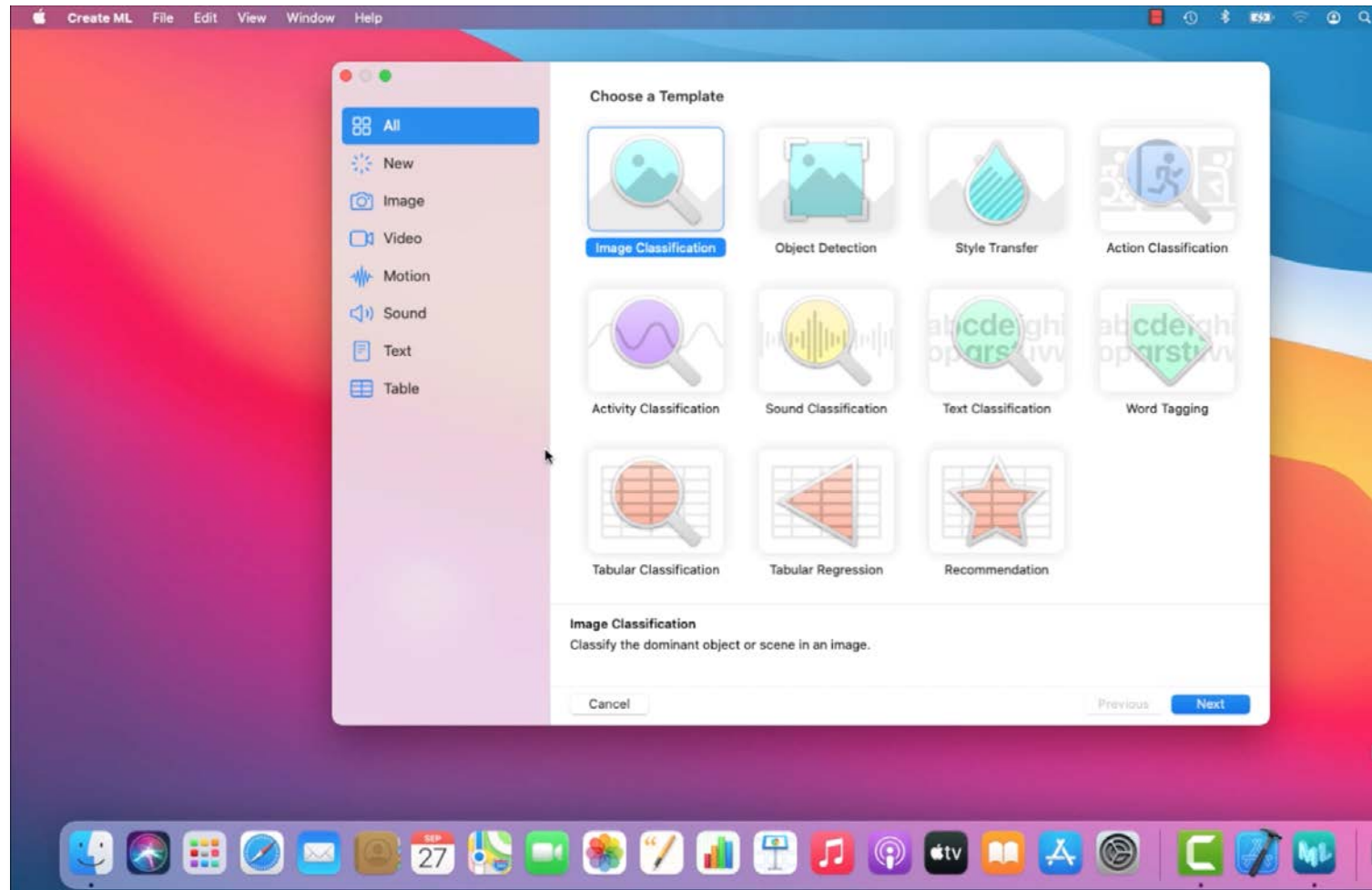
Quellen und weiterführende Infos

- AppleDeveloper (2021): CreatML Overview. Abgerufen von:
<https://developer.apple.com/machine-learning/create-ml/>
- WWDC2020a (2020): Build an Action Classifier with Create ML. Abgerufen von:
<https://developer.apple.com/videos/play/wwdc2020/10043/>
- WWDC2020b (2020): Detect Body and Hand Pose with Vision. Abgerufen von:
<https://developer.apple.com/videos/play/wwdc2020/10653/>

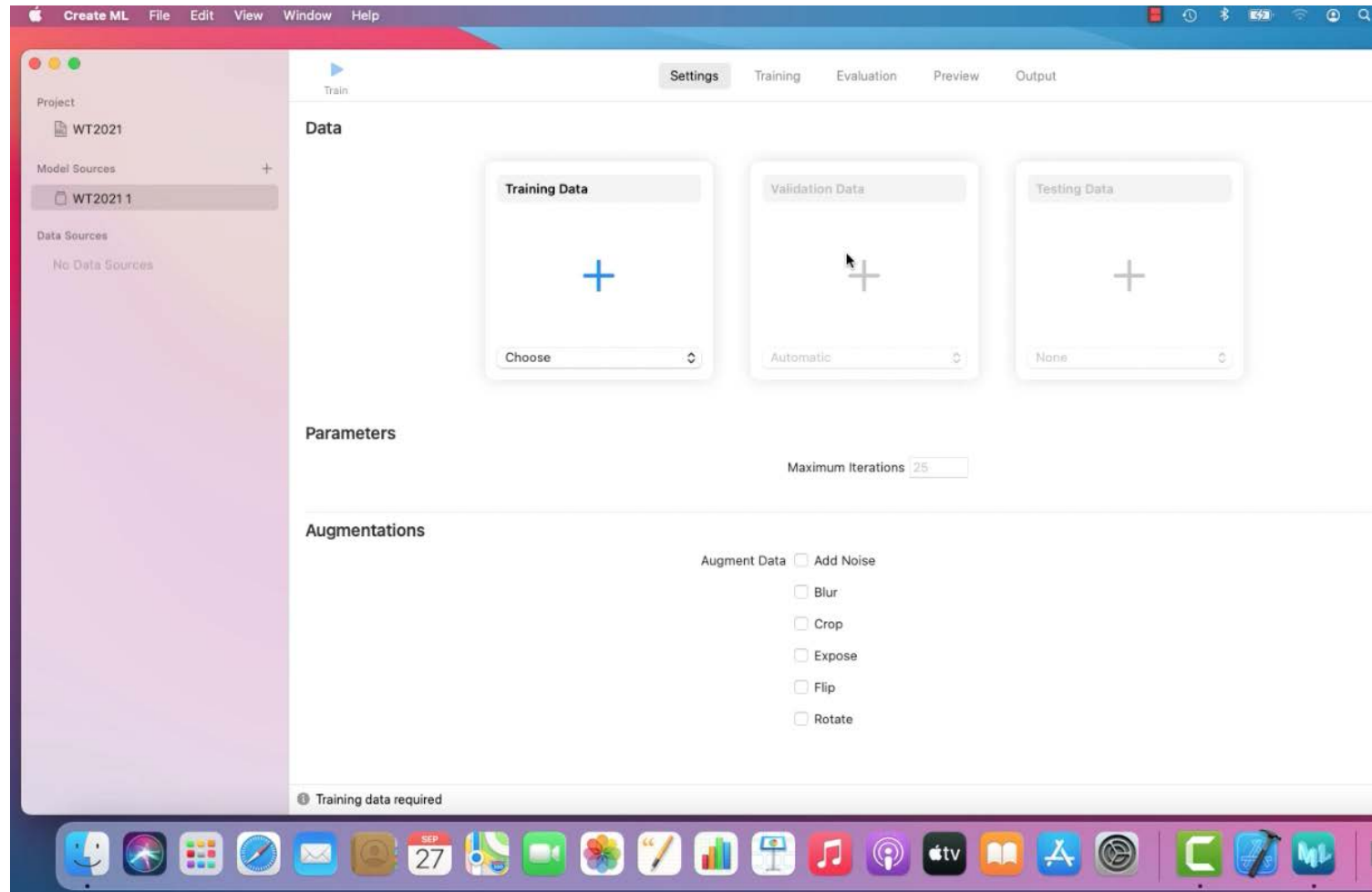
Aufruf der Create ML App



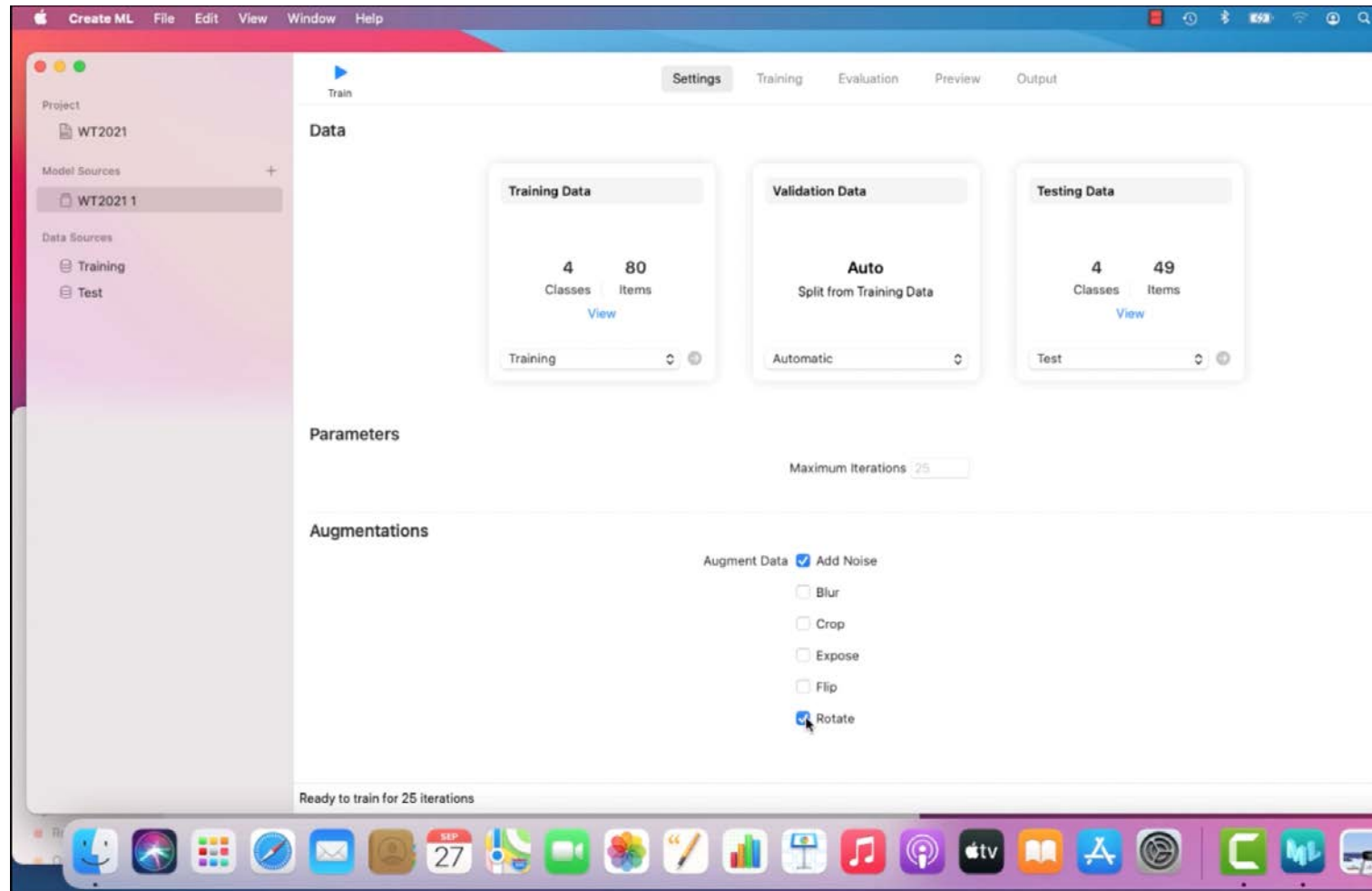
Templateauswahl



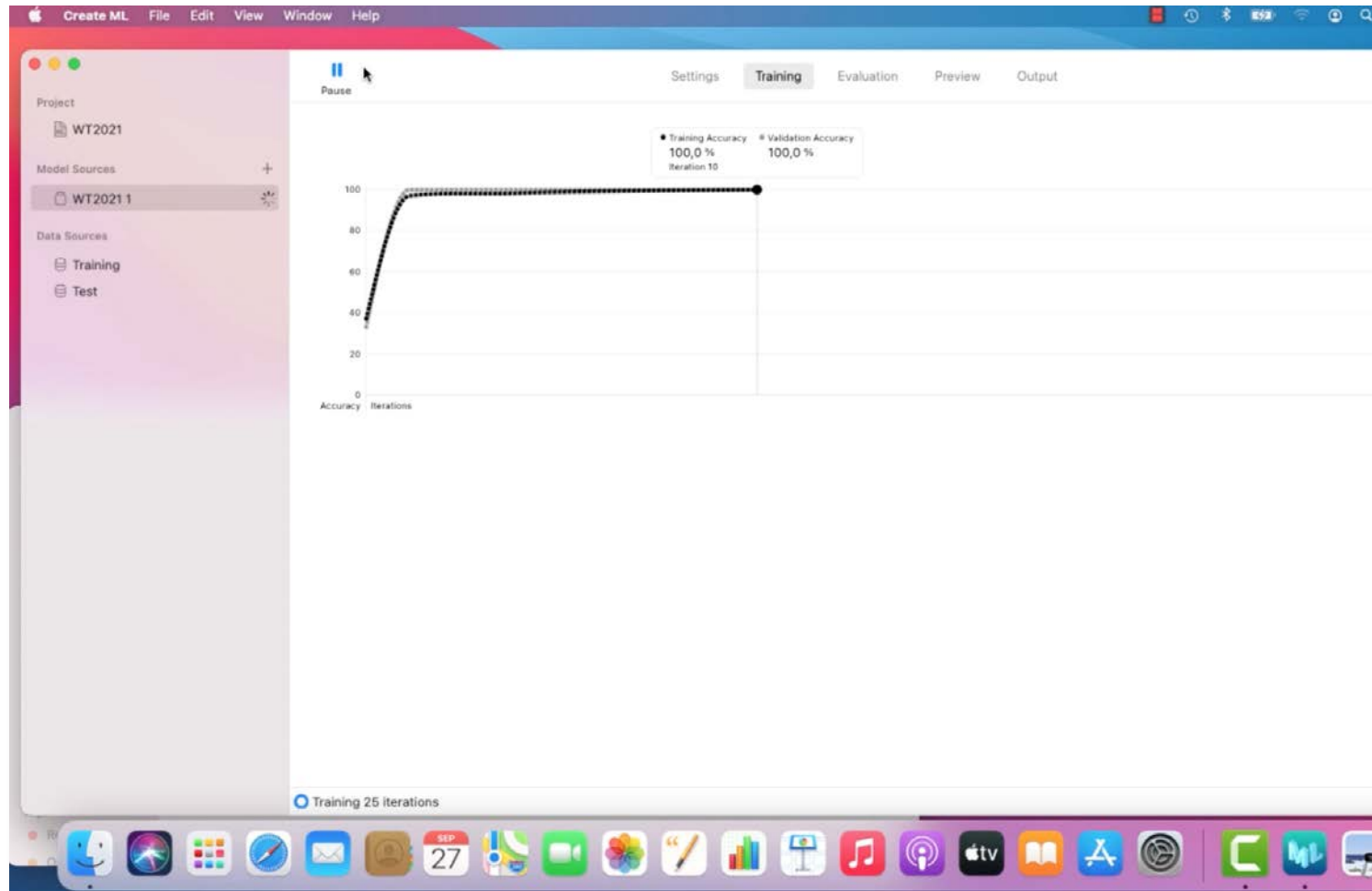
Template für Image Classifier



Konfiguration des Projekts



Training



Evaluation

The screenshot shows the 'Evaluation' tab in the Create ML application. The interface includes a sidebar with project and data sources, a central panel for training and testing progress, and a main area for testing data and results.

Testing Data Summary:

Classes	Items
4	49

[View](#)

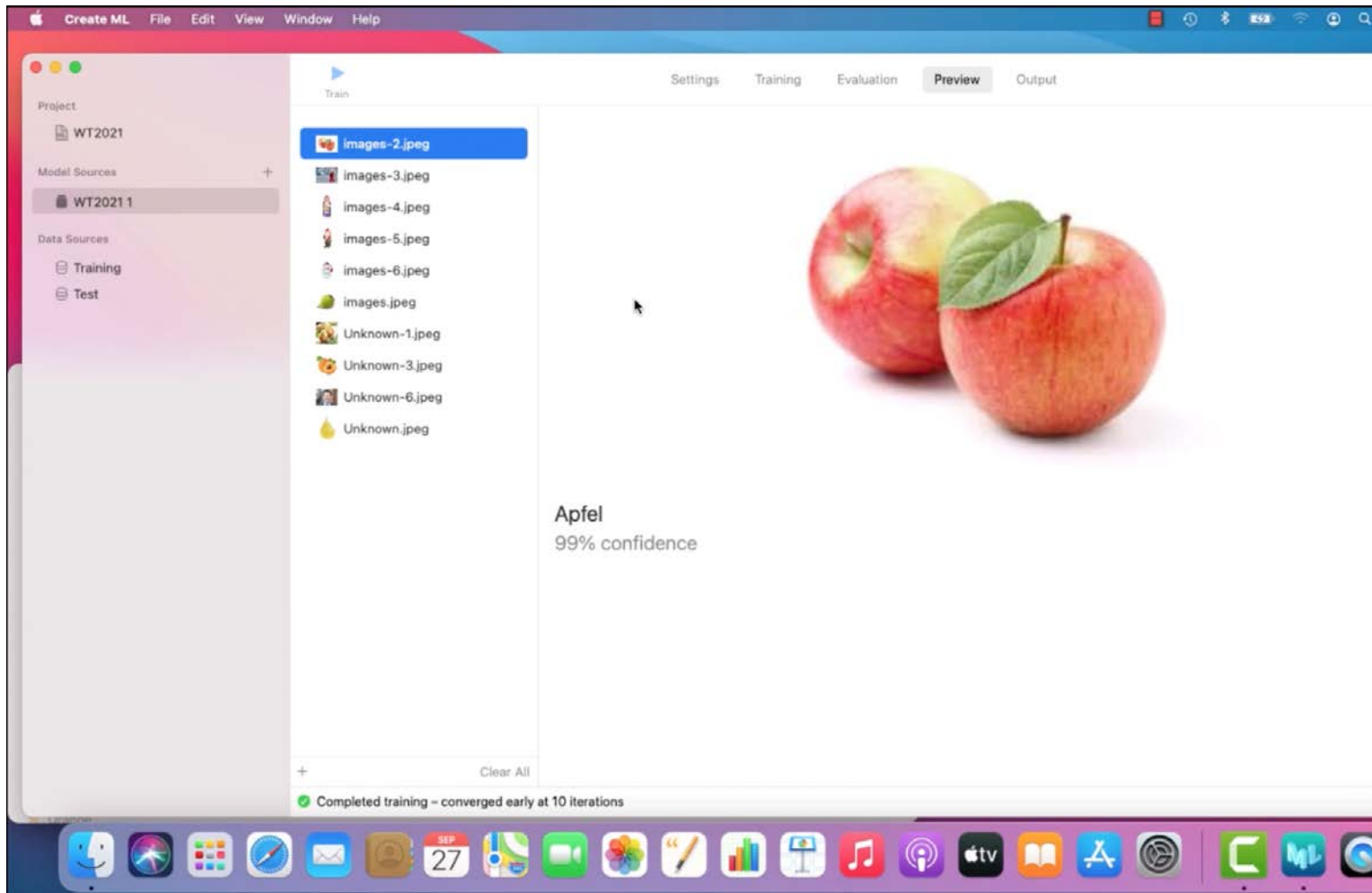
Test

Test Results Table:

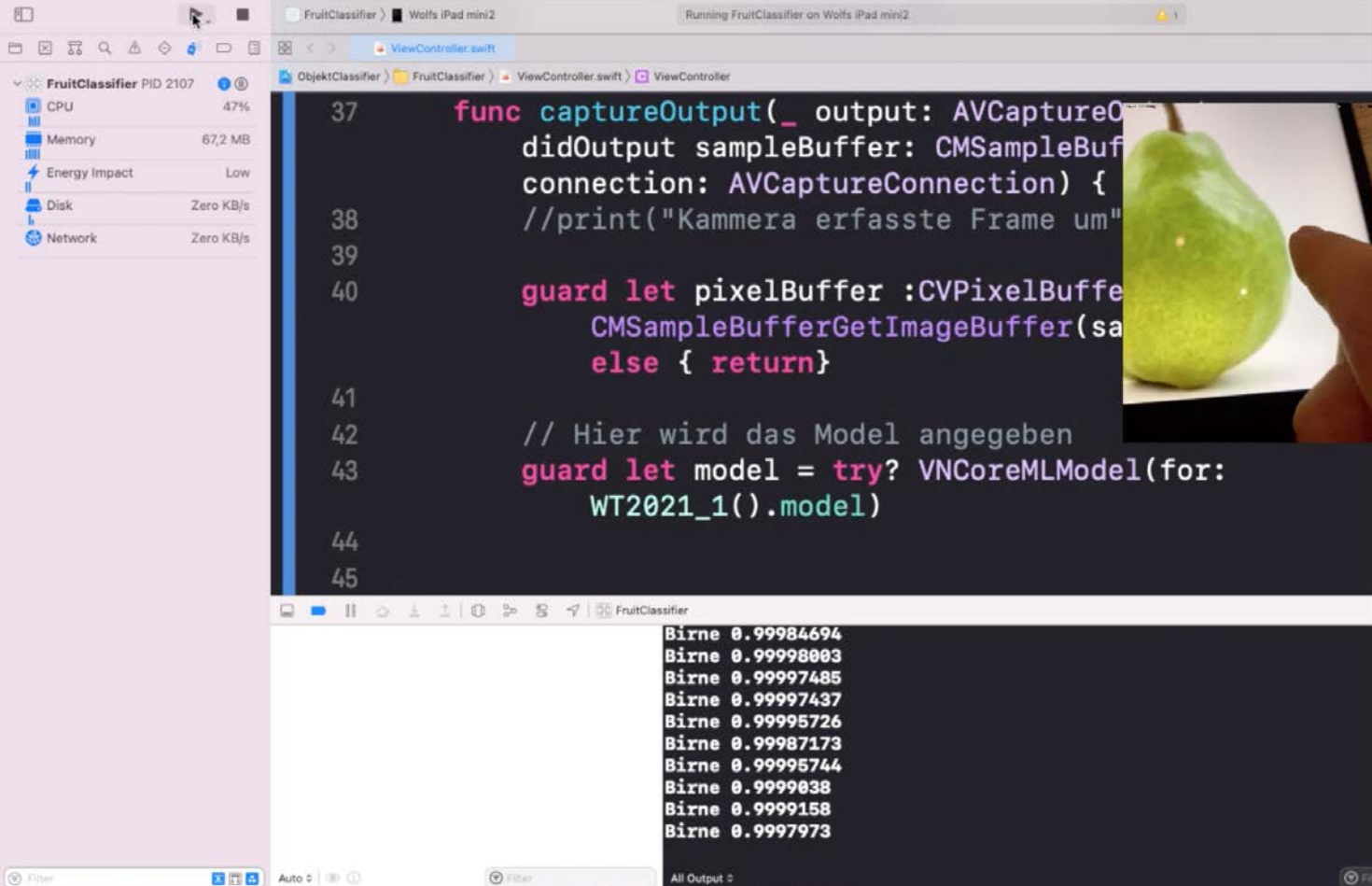
Class	Item Count	Precision	Recall
Apfel	12	92 %	100 %
Birne	13	100 %	92 %
Osterhase	12	92 %	100 %
Weihnachtsmann	12	100 %	92 %

Completed training – converged early at 10 iterations

Preview



Integration



The screenshot displays the Xcode IDE interface for a project named 'FruitClassifier' running on a 'Wolfs iPad mini2'. The left sidebar shows system metrics for the 'FruitClassifier' process (PID 2107): CPU at 47%, Memory at 67.2 MB, Energy Impact at Low, Disk at Zero KB/s, and Network at Zero KB/s. The main editor shows the 'ViewController.swift' file with the following code:

```
37 func captureOutput(_ output: AVCaptureOutput, didOutput sampleBuffer: CMSampleBuffer, from connection: AVCaptureConnection) {
38     //print("Kamera erfasste Frame um")
39
40     guard let pixelBuffer :CVPixelBuffer = CMSampleBufferGetImageBuffer(sampleBuffer) else { return}
41
42     // Hier wird das Model angegeben
43     guard let model = try? VNCoreMLModel(for: WT2021_1().model)
44
45 }
```

The console output at the bottom shows the following classification results:

```
Birne 0.99984694
Birne 0.99998003
Birne 0.99997485
Birne 0.99997437
Birne 0.99995726
Birne 0.99987173
Birne 0.99995744
Birne 0.9999038
Birne 0.9999158
Birne 0.9997973
```

An inset image in the top right corner shows a green pear being held by a hand, which is the input image for the model.