Nhận diện khuôn mặt MTCNN và Facenet

Lớp: CS232.M21
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Mục lục

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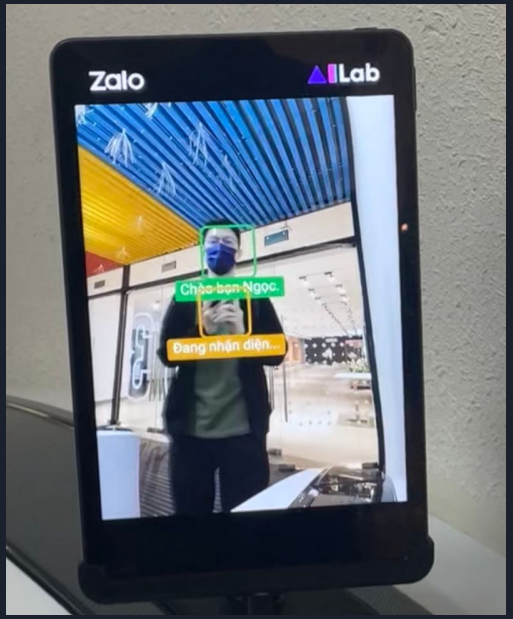
Đặt vấn đề


9:41
Cancel
Second Face ID
scan complete.


Zalo
AI Lab
Chào bạn Ngọc.
Đang nhận diện...

Yêu cầu bài toán

Input

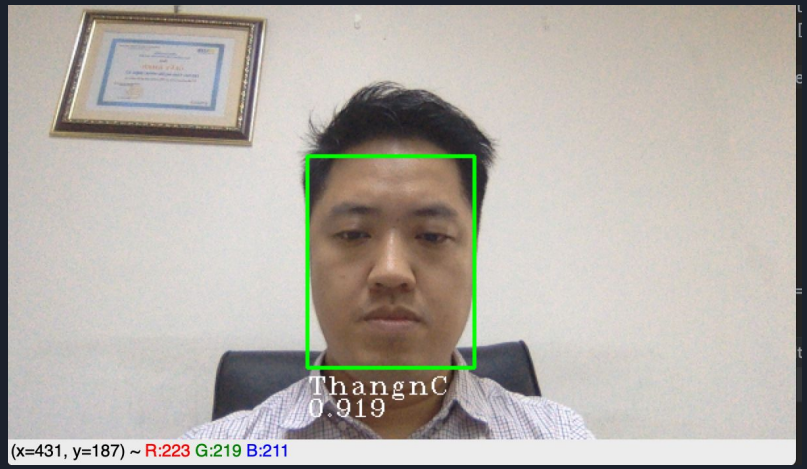
Unknown

Output

Trung

Hướng giải quyết

Cơ sở lý thuyết: MTCNN

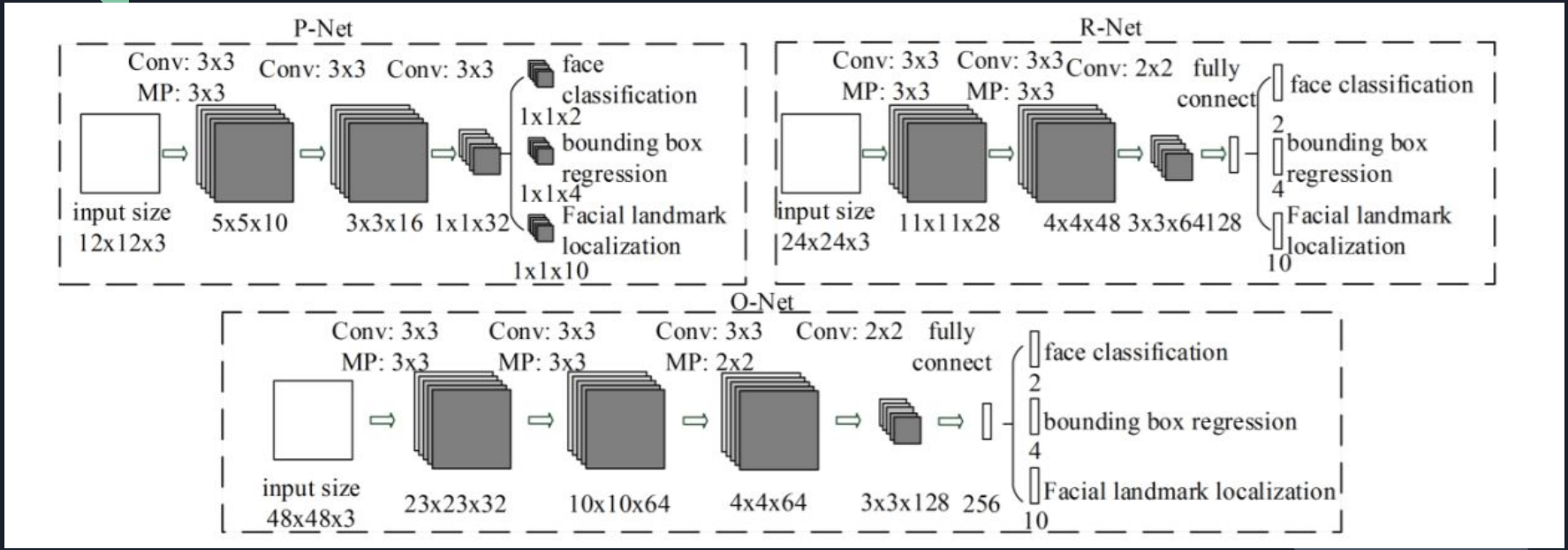


Multi-task Cascaded Convolutional Networks.

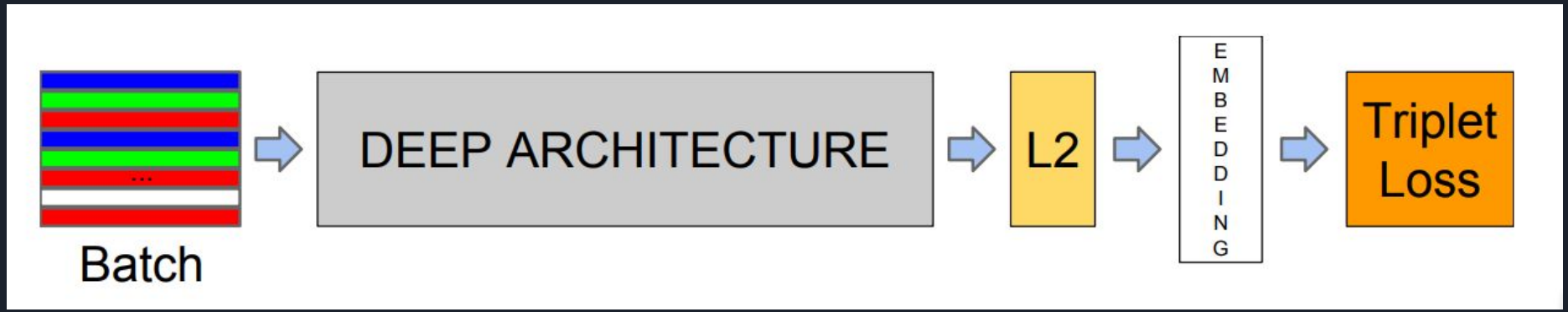
Được dùng để phát hiện khuôn mặt (face detector).

Dựa trên một bài báo công bố năm 2016, đăng tải trên IEEE Signal Processing Letters.

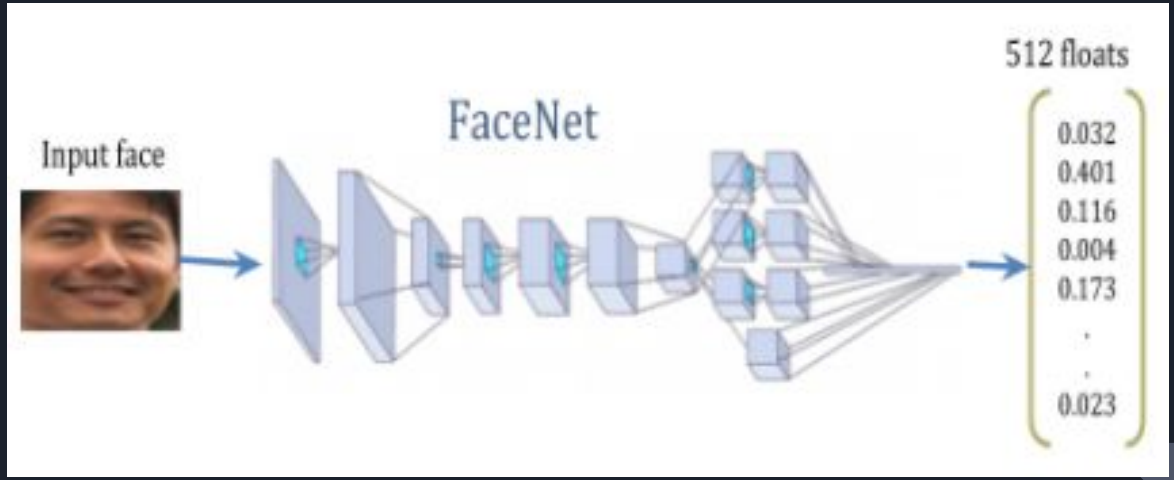
Cơ sở lý thuyết: MTCNN



Cơ sở lý thuyết: Facenet



Cơ sở lý thuyết: Facenet



Cơ sở lý thuyết: Facenet

```
if (bb[i][3]-bb[i][1])/frame.shape[0] > 0.0:

    cropped = frame[bb[i][1]:bb[i][3], bb[i][0]:bb[i][2], :]

    scaled_out = cv2.resize(cropped, (INPUT_IMAGE_SIZE, INPUT_IMAGE_SIZE),
                            interpolation=cv2.INTER_CUBIC)

    scaled = facenet.prewhiten(scaled_out)
    scaled_reshape = scaled.reshape(-1,
                                    INPUT_IMAGE_SIZE, INPUT_IMAGE_SIZE, 3)
    feed_dict = {images_placeholder: scaled_reshape,
                 phase_train_placeholder: False}
    emb_array = sess.run(embeddings, feed_dict=feed_dict)

    print("emb_array.shape: ", emb_array.shape)
    emb_array = sess.run(embeddings, feed_dict=feed_dict)
    # lưu lại ảnh vào folder data
    cv2.imwrite(folder + str(cnt) + '.jpg', scaled_out)
    emb_array = np.append(emb_array, name)
    my_features = np.array(emb_array)
    my_features = my_features.reshape(-1, my_features.shape[0])
    df = pd.DataFrame(my_features)
    df.to_csv("features.csv", mode='a',
              header=None, index=False)
    cnt += 1
```

Cơ sở lý thuyết: Facenet

0.019598	0.050227	0.001249	0.049631	0.017979	-0.00327	-0.01038	-0.03904	0.013534	0.038958	0.029691	0.014986	-0.06998	0.0145	0.004738	-0.02405	0.070093
0.001518	0.027904	-0.01265	0.060697	-0.01326	-0.03482	-0.01928	-0.01866	0.018969	0.039257	0.050452	0.050663	-0.05165	0.000964	-0.01816	0.038306	0.08008
0.001484	0.021317	-0.01249	0.055331	-0.03105	-0.03991	-0.03322	0.002208	0.014196	0.030568	0.037684	0.058868	-0.05108	0.006947	-0.02263	0.033041	0.086454
-0.00443	0.023015	-0.0221	0.050255	-0.02292	-0.03075	-0.02234	-0.00375	0.019679	0.04415	0.049432	0.059017	-0.05309	0.001091	-0.02703	0.019331	0.088733
-0.00223	0.035104	-0.01592	0.062637	-0.02908	-0.03187	-0.03132	0.003936	0.010132	0.037892	0.033182	0.046432	-0.06175	0.007895	-0.02664	0.001015	0.08278
0.004178	0.03786	-0.00855	0.05049	-0.02144	-0.03357	-0.01446	-0.01759	0.017506	0.034864	0.024632	0.037972	-0.05978	0.00354	-0.02399	0.013356	0.07703
0.010109	0.021138	-0.0186	0.053278	-0.03282	-0.03276	-0.01836	-0.01006	0.006164	0.028585	0.055336	0.049022	-0.04045	0.001429	-0.02052	0.04226	0.080987
0.003499	0.03787	-0.02199	0.042501	-0.0378	-0.03629	-0.02438	0.012452	0.004532	0.042892	0.050912	0.03577	-0.05226	-0.00432	-0.00663	0.010368	0.077862
0.01142	0.026344	-0.02575	0.052862	-0.03484	-0.02981	-0.0408	0.005839	-0.00117	0.028058	0.049298	0.025436	-0.05582	0.007797	-0.00673	-0.00929	0.083447
0.004992	0.019548	-0.0325	0.053407	-0.03981	-0.01334	-0.03102	0.013581	-0.0058	0.041451	0.044914	0.050697	-0.05382	0.01573	-0.001	-0.00608	0.091054
0.01471	0.023981	-0.02943	0.076993	0.007876	-0.01116	-0.03363	0.000986	0.015958	-0.08355	0.012395	-0.01814	-0.04155	-0.00049	-0.04143	-0.04567	0.026167
0.014777	0.011431	-0.04192	0.042636	-0.00386	-0.00782	-0.04715	0.001864	0.01399	-0.02191	0.0368	0.013867	-0.04568	-0.02905	-0.02208	-0.01578	0.052252
0.001793	-0.01991	-0.03819	0.067132	-0.00515	-0.01317	-0.00228	-0.01215	0.015691	0.013372	0.025261	0.039356	-0.01701	0.006002	-0.02942	0.00586	0.064325
-0.00757	-0.00533	-0.03958	0.059655	-0.01621	-0.00848	-0.02149	-0.0094	-0.0049	0.037105	0.031442	0.045393	-0.03874	0.014243	-0.012	-0.00503	0.066
-0.00145	-0.02103	-0.03401	0.060129	-0.01063	-0.02341	-0.01065	-0.02418	0.025876	0.027128	0.040392	0.052098	-0.02247	0.009918	-0.00769	-0.00212	0.067561
-0.00736	-0.01404	-0.04564	0.047984	-0.01767	-0.00426	-0.01408	-0.02071	0.011475	0.021303	0.033522	0.045692	-0.02319	0.00542	-0.02439	-0.00498	0.046083
0.033468	-0.00483	-0.02729	0.061155	0.000192	-0.00893	-0.04843	-0.00666	0.021714	-0.04731	0.054681	0.016194	-0.00367	-0.0029	-0.04838	-0.02612	0.038152
0.00483	-0.00519	-0.02404	0.03142	-0.01991	-0.0156	-0.02013	-0.0248	-0.00062	0.003198	0.049188	0.023403	-0.02229	0.013895	-0.02044	0.004579	0.045551
-0.00165	0.049197	-0.02505	0.028608	-0.00222	0.010498	-0.03158	0.003394	-0.01386	0.029547	0.01618	0.010232	-0.0604	0.010649	-0.02257	-0.0216	0.03904
0.005697	0.049889	-0.03364	0.030333	-0.01906	-0.04472	-0.04163	0.026781	0.016621	0.008012	0.011694	0.043956	-0.04488	-0.00349	-0.04663	-0.02851	0.054539
0.027257	0.031872	-0.01486	0.048449	-0.01977	-0.00972	-0.02946	0.000319	0.01414	0.025226	0.005189	0.035656	-0.02912	0.040418	-0.05203	-0.02464	0.030155
0.016499	0.01157	-0.00766	0.063053	-0.0216	-0.00399	-0.01835	-0.02528	0.017268	0.027128	0.049933	0.063597	-0.01491	0.042351	-0.02441	0.007358	0.068753
0.01875	0.010048	-0.00365	0.050921	-0.012	0.018241	-0.00062	-0.03739	0.001382	0.032885	0.068227	0.044046	-0.01617	0.046903	-0.01571	0.002289	0.064501
0.031815	0.026056	-0.00512	0.069774	-0.00415	0.038174	-0.0258	-0.00034	0.010178	0.040564	0.025956	0.055939	-0.04006	0.046628	-0.00746	-0.01508	0.089863
0.024084	0.01921	0.00559	0.060865	-0.02417	0.013366	-0.01181	-0.01943	0.004293	0.037963	0.040301	0.047464	-0.02865	0.047285	-0.00437	-0.01555	0.064612
0.006305	0.042819	-0.02235	0.043005	-0.023	-0.02951	-0.02433	-0.00259	0.026314	0.018425	0.020676	0.033514	-0.0093	0.026249	-0.05925	-0.00814	0.044313
-0.01137	0.08092	-0.03784	0.025485	-0.00104	-0.01821	-0.05543	0.04646	0.027526	0.005724	0.007989	-0.00816	-0.02106	-0.00203	-0.06431	-0.05896	0.010493
0.004722	0.055391	-0.0574	0.041744	0.020208	0.014783	-0.04413	0.004815	0.006524	-0.05722	-0.00159	-0.02178	-0.02431	-0.04456	-0.02395	-0.014	-0.00105
0.039793	-0.02366	-0.09368	0.016098	0.001138	0.004731	-0.00227	0.014219	-0.02804	0.019138	-0.00542	0.018646	-0.02937	-0.03961	-0.01348	0.043484	0.055165
0.008456	-0.01202	-0.08784	0.06633	0.012265	0.065563	-0.02953	0.029659	-0.056	0.045466	0.0341	0.057564	-0.02858	-0.00464	-0.01655	0.046087	0.066285
0.031849	0.007504	-0.04817	0.056879	0.014671	0.036739	-0.02137	0.02068	-0.02104	0.034859	0.036984	0.02181	-0.02807	0.004216	-0.00099	0.039089	0.078034
0.025777	0.013514	-0.06108	0.056851	0.009157	0.025439	-0.02466	0.034694	-0.02879	0.058178	0.018231	0.015434	-0.04752	-0.01493	-0.01018	0.046363	0.07904
0.004292	0.009594	-0.08301	0.026707	0.012031	0.021585	-0.01655	0.035389	-0.03472	0.065032	0.031628	0.008146	-0.04083	-0.0276	0.004292	0.034557	0.056337
-0.00708	0.065359	-0.04418	0.032924	0.017421	0.025543	-0.01572	0.03224	-0.00261	0.052002	0.030478	0.015752	-0.04322	0.004004	-0.00685	-0.0264	0.066273
-0.01927	0.047793	-0.05774	0.052155	0.010404	0.009811	-0.03482	0.028737	0.01385	0.020543	0.057687	0.012726	0.010531	-0.02364	-0.05604	0.014066	0.047262

0.019636	-0.07369	0.002072	-0.01738	Trung
0.017694	-0.07421	0.015174	-0.02759	Trung
0.018086	-0.08019	-0.0032	-0.01402	Trung
0.026379	-0.06916	0.009195	-0.00748	Trung
0.022795	-0.06968	0.033765	-0.0369	Trung
0.002978	-0.07257	0.047393	-0.00856	Trung
0.015943	-0.06835	0.04071	-0.01806	Trung
0.001176	-0.07653	0.029157	-0.00772	Trung
0.012801	-0.07371	0.036566	-0.01602	Trung
0.011631	-0.06307	0.024261	-0.03244	Trung
0.010996	-0.07925	0.010379	-0.00747	Trung
0.022972	-0.07359	0.000877	-0.00678	Trung
0.016653	-0.08273	-0.00257	-0.01313	Trung
0.025419	-0.08059	-0.00072	-0.01478	Trung
-0.00292	-0.07594	0.000624	-0.02224	Trung
-0.00301	-0.07686	-0.00097	-0.009	Trung
-0.00731	-0.07227	-0.00093	-0.02137	Trung
0.012666	-0.06279	0.017408	-0.03653	Trung
0.028001	-0.04332	0.040352	-0.01185	Trung
0.005647	-0.04238	0.037741	-0.01454	Trung
0.019754	-0.03601	0.047555	-0.01207	Trung
0.008489	-0.04484	0.026267	-0.01614	Trung
0.015306	-0.05138	0.02566	-0.02372	Trung
0.016001	-0.05319	0.030173	-0.01996	Trung
0.028124	-0.06326	0.0274	0.008278	Trung
0.009934	-0.0776	0.009781	-0.00477	Trung
0.022819	-0.07917	0.019924	0.001277	Trung
0.018796	-0.07316	0.019656	-0.0047	Trung
0.018884	-0.07562	0.011778	0.004832	Trung
0.015201	-0.07023	0.017124	-0.0008	Trung
0.002256	-0.07611	0.009508	-0.00513	Trung
0.020347	-0.09689	-0.026	0.018271	Trung
-0.01636	-0.07696	0.004776	-0.0118	Trung
-0.00717	-0.07802	0.013059	-0.01774	Trung
0.009329	-0.07121	-0.00354	-0.01299	Trung

Cơ sở lý thuyết: Facenet

Cơ sở lý thuyết: Facenet

```
df = pd.read_csv('features.csv')

labels = df.iloc[:, -1].values

emb_array = df.iloc[:, 0:-1].values
classifier_filename_exp = os.path.expanduser(
    "./model/facemodels.pkl")

sav = pd.read_csv('labels.csv', header=None)
model = SVC(kernel='linear', probability=True)
model.fit(emb_array, labels)
```

Cơ sở lý thuyết: Facenet

```
if best_class_probabilities > 0.85:
    cv2.rectangle(
        frame, (bb[i][0], bb[i][1]), (bb[i][2], bb[i][3]), (0, 255, 0), 2)
    text_x = bb[i][0]
    text_y = bb[i][3] + 20

    cv2.putText(frame, name_r, (text_x, text_y), cv2.FONT_HERSHEY_COMPLEX_SMALL, 1, (
        255, 255, 255), thickness=1, lineType=2)
else:
    cv2.rectangle(
        frame, (bb[i][0], bb[i][1]), (bb[i][2], bb[i][3]), (0, 255, 0), 2)
    text_x = bb[i][0]
    text_y = bb[i][3] + 20

    name = "Unknown"
    cv2.putText(frame, name, (text_x, text_y), cv2.FONT_HERSHEY_COMPLEX_SMALL, 1, (
        255, 255, 255), thickness=1, lineType=2)
```

Demo

Ngôn ngữ sử dụng: Python

Môi trường phát triển: Python 3.7, VS Code

Thư viện sử dụng: tensorflow, scipy, scikit-learn, opencv, matplotlib, Pillow, …

Cấu hình máy thực hiện: i5-7300HQ, 8GB RAM

Tổng kết