ArcSoft, Inc.

ArcSoft Face Recognition

开发指导文档

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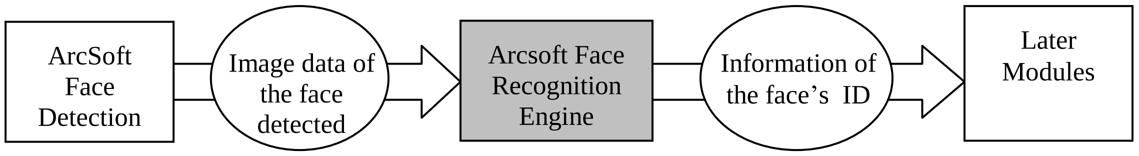
1. 概述

虹软人脸识别引擎工作流程图：


ArcSoft Face Detection
Image data of the face detected
Arcsoft Face Recognition Engine
Information of the face’s ID
Later Modules

1.1. 运行环境

- Windows

1.2. 系统要求

- 32 位系统，Windows7 以上

1.3. 依赖库

- None

2. 结构与常量

2.1. 基本类型

所有基本类型在平台库中有定义。 定义规则是在 ANSIC 中的基本类型前加上字母“M”同时将类型的第一个字母改成大写。例如“long” 被定义成“MLong”

2.2. 数据结构

2.2.1. AFR_FSDK_FACEINPUT

功能描述

脸部信息

定义

```
typedef struct{
       MRECT          rcFace;
       MInt32         lOrient;
} AFR_FSDK_FACEINPUT, *LPAFR_FSDK_FACEINPUT;
```

成员变量

rcFace	脸部矩形框信息
lOrient	脸部旋转角度

2.2.2. AFR_FSDK_FACEMODEL

功能描述

脸部特征信息

定义

```
typedef struct{
       MByte          *pbFeature;
       MInt32         lFeatureSize;
} AFR_FSDK_FACEMODEL, *LPAFR_FSDK_FACEMODEL;
```

成员变量

pbFeature	提取到的脸部特征
lFeatureSize	特征信息长度

2.2.3. AFR_FSDK_VERSION

功能描述

引擎版本信息.

定义

```
typedef struct{
      MInt32              lCodebase;
      MInt32              lMajor;
      MInt32              lMinor;
      MInt32              lBuild;
      MInt32              lFeatureLevel;
      MPChar              Version;
      MPChar              BuildDate;
      MPChar              CopyRight;
} AFR_FSDK_VERSION, *LPAFR_FSDK_VERSION;
```

成员变量

lCodebase	代码库版本号
lMajor	主版本号
lMinor	次版本号
lBuild	编译版本号，递增
lFeatureLevel	特征库版本号
strVersion	字符串形式的版本号
strBuildDate	编译时间
strCopyRight	Copyright

2.3. 枚举

2.3.1. AFR_FSDK_ORIENTCODE

功能描述

基于逆时针的脸部方向枚举值

定义

```
enum AFR_FSDK_ORIENTCODE{
      AFR_FSDK_FOC_0             = 0x1,
      AFR_FSDK_FOC_90            = 0x2,
      AFR_FSDK_FOC_270           = 0x3,
        AFR_FSDK_FOC_180            = 0x4,
        AFR_FSDK_FOC_30             = 0x5,
        AFR_FSDK_FOC_60             = 0x6,
        AFR_FSDK_FOC_120            = 0x7,
        AFR_FSDK_FOC_150            = 0x8,
        AFR_FSDK_FOC_210            = 0x9,
        AFR_FSDK_FOC_240            = 0xa,
        AFR_FSDK_FOC_300            = 0xb,
        AFR_FSDK_FOC_330            = 0xc
};
```

成员变量

AFR_FSDK_FOC_0	0 度
AFR_FSDK_FOC_90	90 度
AFR_FSDK_FOC_270	270 度
AFR_FSDK_FOC_180	180 度
AFR_FSDK_FOC_30	30 度
AFR_FSDK_FOC_60	60 度
AFR_FSDK_FOC_120	120 度
AFR_FSDK_FOC_150	150 度
AFR_FSDK_FOC_210	210 度
AFR_FSDK_FOC_240	240 度
AFR_FSDK_FOC_300	300 度
AFR_FSDK_FOC_330	330 度

2.3.2. 支持的颜色格式

描述

颜色格式及其对齐规则

定义

ASVL_PAF_I420	8-bit Y 层，之后是 8-bit 的 2x2 采样的 U 层和 V 层
ASVL_PAF_YUYV	Y0, U0, Y1, V0
ASVL_PAF_RGB24_B8G8R8	BGR24, B8G8R8

3. API Reference

3.1. AFR_FSDK_InitialEngine

原型

```
MRESULT AFR_FSDK_InitialEngine(
       MPChar        AppId,
       MPChar        SDKKey,
       Mbyte         *pMem,
       MInt32        lMemSize,
       MHandle       *phEngine
);
```

功能描述

初始化引擎

参数

Appid	[in]	用户申请 SDK 时获取的 id
SDKKey	[in]	用户申请 SDK 时获取的 id
pMem	[in]	分配给引擎使用的内存地址
lMemSize	[in]	分配给引擎使用的内存大小
phEngine	[out]	引擎 handle

返回值

成功返回 MOK，否则返回失败 code。失败 codes 如下所列:

MERR_INVALID_PARAM	参数输入非法
MERR_NO_MEMORY	内存不足

3.2. AFR_FSDK_ExtractFRFeature

原型

```
MRESULT AFR_FSDK_ExtractFRFeature (
       MHandle                    hMemMgr,
       MHandle                    hEngine,
       LPASVLOFFSCREEN            pInputImage,
       LPAFR_FSDK_FACEINPUT       pFaceRes,
       LPAFR_FSDK_FACEMODEL       pFaceModels
);
```

功能描述

获取脸部特征

参数

hEngine	[in]	引擎 handle
pInputImage	[in]	输入的图像数据
pFaceRes	[in]	已检测到到的脸部信息
pFaceModels	[out]	提取的脸部特征信息

返回值

成功返回 MOK，否则返回失败 code。失败 codes 如下所列:

MERR_INVALID_PARAM	参数输入非法
MERR_NO_MEMORY	内存不足

3.3. AFR_FSDK_FacePairMatching

原型

```
MRESULT AFR_FSDK_FacePairMatching(
       MHandle                    hEngine,
       AFR_FSDK_FACEMODEL         *reffeature,
       AFR_FSDK_FACEMODEL         *probefeature,
       MFloat                     *pfSimilScore
);
```

功能描述

脸部特征比较.

参数

hEngine	[in]	引擎 handle
reffeature	[in]	已有脸部特征信息
probefeature	[in]	被比较的脸部特征信息
pfSimilScore	[out]	相似程度数值

返回值

成功返回 MOK，否则返回失败 code。失败 codes 如下所列:

MERR_INVALID_PARAM	参数输入非法
MERR_NO_MEMORY	内存不足

3.4. AFR_FSDK_UninitialEngine

原型

```
MRESULT AFR_FSDK_UninitialEngine(
       MHandle          hEngine
);
```

功能描述

结束引擎

参数

hEngine	[in]	引擎 handle

返回值

成功返回 MOK，否则返回失败 code。失败 codes 如下所列:

MERR_INVALID_PARAM	参数输入非法

3.5. AFR_FSDK_GetVersion

原型

```
const AFR_FSDK_VERSION *  AFR_FSDK_GetVersion(MHandle          hEngine);
```

参数

hEngine	[in]	引擎 handle

功能描述

获取引擎版本信息

参数

None

4. 示例代码

注意,使用时请替换申请的 **APPID SDKKEY**，并设置好文件路径和图像尺寸

```
#include <stdio.h>
#include <stdlib.h>
#include <stdint.h>
#include <Windows.h>
#include "arcsoft_fsdk_face_recognition.h"
#include "merror.h"

#pragma comment(lib,"libarcsoft_fsdk_face_recognition.lib")

#define WORKBUF_SIZE        (40*1024*1024)
#define INPUT_IMAGE1_PATH "sample1.bmp"
#define INPUT_IMAGE2_PATH "sample2.bmp"
#define APPID       ""                  //APPID
#define SDKKey      ""                  //SDKKey

bool readBmp24(const char* path, uint8_t **imageData, int *pWidth, int *pHeight)
{
	if (path == NULL || imageData == NULL || pWidth == NULL || pHeight == NULL)
	{
		return false;
	}
	FILE *fp = fopen(path, "rb");
	if (fp == NULL)
	{
		return false;
	}
	fseek(fp, sizeof(BITMAPFILEHEADER), 0);
	BITMAPINFOHEADER head;
	fread(&head, sizeof(BITMAPINFOHEADER), 1, fp);
	*pWidth = head.biWidth;
	*pHeight = head.biHeight;
	int biBitCount = head.biBitCount;
	if (24 == biBitCount)
	{
		int lineByte = ((*pWidth) * biBitCount / 8 + 3) / 4 * 4;
		*imageData = (uint8_t *)malloc(lineByte * (*pHeight));
		uint8_t * data = (uint8_t *)malloc(lineByte * (*pHeight));
		fseek(fp, 54, SEEK_SET);
		fread(data, 1, lineByte * (*pHeight), fp);
		for (int i = 0; i < *pHeight; i++)
		{
			for (int j = 0; j < *pWidth; j++)
			{
				memcpy((*imageData) + i * (*pWidth) * 3 + j * 3, data + 
(((*pHeight) - 1) - i) * lineByte + j * 3, 3);
			}
		}
		free(data);
	}
	else
```

```
        {
                fclose(fp);
                return false;
        }
        fclose(fp);
        return true;
}
int main()
{
        /* 初始化引擎和变量 */
        MRESULT nRet = MERR_UNKNOWN;
        MHandle hEngine = nullptr;
        MInt32 nScale = 16;
        MInt32 nMaxFace = 10;
        MByte *pWorkMem = (MByte *)malloc(WORKBUF_SIZE);
        if (pWorkMem == nullptr)
        {
                return -1;
        }
        nRet = AFR_FSDK_InitialEngine(APPID, SDKKey, pWorkMem, WORKBUF_SIZE,
&hEngine);
        if (nRet != MOK)
        {
                return -1;
        }
        /* 打印版本信息 */
        const AFR_FSDK_Version * pVersionInfo = nullptr;
        pVersionInfo = AFR_FSDK_GetVersion(hEngine);
        fprintf(stdout, "%d %d %d %d %d\n", pVersionInfo->lCodebase, pVersionInfo-
>lMajor, pVersionInfo->lMinor, pVersionInfo->lBuild, pVersionInfo->lFeatureLevel);
        fprintf(stdout, "%s\n", pVersionInfo->Version);
        fprintf(stdout, "%s\n", pVersionInfo->BuildDate);
        fprintf(stdout, "%s\n", pVersionInfo->CopyRight);

        /* 读取第一张静态图片信息，并保存到ASVLOFFSCREEN结构体 （以
ASVL_PAF_RGB24_B8G8R8格式为例） */
        ASVLOFFSCREEN offInput1 = { 0 };
        offInput1.u32PixelArrayFormat = ASVL_PAF_RGB24_B8G8R8;
        offInput1.ppu8Plane[0] = nullptr;
        readBmp24(INPUT_IMAGE1_PATH, (uint8_t**)&offInput1.ppu8Plane[0],
&offInput1.i32Width, &offInput1.i32Height);
        if (!offInput1.ppu8Plane[0])
        {
                fprintf(stderr, "fail to ReadBmp(%s)\n", INPUT_IMAGE1_PATH);
                AFR_FSDK_UninitialEngine(hEngine);
                free(pWorkMem);
                return -1;
        }
        offInput1.pi32Pitch[0] = offInput1.i32Width * 3;
        AFR_FSDK_FACEMODEL faceModels1 = { 0 };
        {
                AFR_FSDK_FACEINPUT faceInput;
                //第一张人脸信息通过face detection\face tracking获得
                faceInput.lOrient = AFR_FSDK_FOC_0;//人脸方向
                //人脸框位置
                faceInput.rcFace.left = 346;
```

```
			faceInput.rcFace.top = 58;
			faceInput.rcFace.right = 440;
			faceInput.rcFace.bottom = 151;
			//提取第一张人脸特征
			AFR_FSDK_FACEMODEL LocalFaceModels = { 0 };
			nRet = AFR_FSDK_ExtractFRFeature(hEngine, &offInput1, &faceInput, 
&LocalFaceModels);
			if (nRet != MOK)
			{
				fprintf(stderr, "fail to Extract 1st FR Feature, error 
code: %d\n", nRet);
			}
			/* 拷贝人脸特征结果 */
			faceModels1.lFeatureSize = LocalFaceModels.lFeatureSize;
			faceModels1.pbFeature = (MByte*)malloc(faceModels1.lFeatureSize);
			memcpy(faceModels1.pbFeature, LocalFaceModels.pbFeature, 
faceModels1.lFeatureSize);
		}
		/* 读取第二张静态图片信息，并保存到ASVLOFFSCREEN结构体 （以
ASVL_PAF_RGB24_B8G8R8格式为例） */
		ASVLOFFSCREEN offInput2 = { 0 };
		offInput2.u32PixelArrayFormat = ASVL_PAF_RGB24_B8G8R8;
		offInput2.ppu8Plane[0] = nullptr;
		readBmp24(INPUT_IMAGE2_PATH, (uint8_t**)&offInput2.ppu8Plane[0], 
&offInput2.i32Width, &offInput2.i32Height);
		if (!offInput2.ppu8Plane[0])
		{
			fprintf(stderr, "fail to ReadBmp(%s)\n", INPUT_IMAGE2_PATH);
			free(offInput1.ppu8Plane[0]);
			AFR_FSDK_UninitialEngine(hEngine);
			free(pWorkMem);
			return -1;
		}
		offInput2.pi32Pitch[0] = offInput2.i32Width * 3;
		AFR_FSDK_FACEMODEL faceModels2 = { 0 };
		{
			AFR_FSDK_FACEINPUT faceInput;
			//第二张人脸信息通过face detection\face tracking获得
			faceInput.lOrient = AFR_FSDK_FOC_0;//人脸方向
			//人脸框位置
			faceInput.rcFace.left = 122;
			faceInput.rcFace.top = 76;
			faceInput.rcFace.right = 478;
			faceInput.rcFace.bottom = 432;
			//提取第二张人脸特征
			AFR_FSDK_FACEMODEL LocalFaceModels = { 0 };
			nRet = AFR_FSDK_ExtractFRFeature(hEngine, &offInput2, &faceInput, 
&LocalFaceModels);
			if (nRet != MOK)
			{
				fprintf(stderr, "fail to Extract 2nd FR Feature, error 
code: %d\n", nRet);
			}
			/* 拷贝人脸特征结果 */
			faceModels2.lFeatureSize = LocalFaceModels.lFeatureSize;
			faceModels2.pbFeature = (MByte*)malloc(faceModels2.lFeatureSize);
			memcpy(faceModels2.pbFeature, LocalFaceModels.pbFeature, 
faceModels2.lFeatureSize);
		}
		/* 对比两张人脸特征，获得比对结果 */
		MFloat  fSimilScore = 0.0f;
		nRet = AFR_FSDK_FacePairMatching(hEngine, &faceModels1, &faceModels2, 
&fSimilScore);
		if (nRet == MOK)
		{
			fprintf(stdout, "fSimilScore =  %f\n", fSimilScore);
		}
		else
		{
			fprintf(stderr, "FacePairMatching failed , errorcode is %d \n", 
nRet);
		}
		/* 释放引擎和内存 */
		nRet = AFR_FSDK_UninitialEngine(hEngine);
		if (nRet != MOK)
		{
			fprintf(stderr, "UninitialFaceEngine failed , errorcode is %d \n", 
nRet);
		}
		free(offInput1.ppu8Plane[0]);
		free(offInput2.ppu8Plane[0]);
		free(faceModels1.pbFeature);
		free(faceModels2.pbFeature);
		free(pWorkMem);
		return 0;
}
```

5. 其他说明

此版本为免费开放的标准版本(为保证最优体验，建议注册人脸数小于 1000)，若有定制升级需求，请联系我们。