Peripheral Facial Paralysis

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Abstract

Many Facial paralysis has fascinated physicians through the centuries. Management of the condition has evolved extensively over the past 50 years, relying largely upon neural repair techniques and static techniques prior to the 1940s, followed by heavy emphasis on regional muscle transfer by the 1970s. With the advent of the operating microscope and the development of micro instrumentation, in the mid-1970s free tissue transfer became technically feasible, and new techniques quickly ensued that introduced functioning muscle as a viable and valuable option in the management of the paralyzed face. These techniques have been subject to continual refinement to improve their reliability and reduce morbidity. In the modern era of evidence-based medicine, the field of facial nerve management has expanded exponentially with critical questions that will help future facial reanimation surgeons refine the approach for patients with acute and long-standing facial paralysis. This article will discuss current research areas with respect to assessment and management of the facial nerve patient, as well as future surgical outcomes. We will also present the state of both clinical research and contemporary basic science issues relevant to facial nerve disorders

Introduction

The face plays an important role in visual communication. By looking at the face, a person can automatically extract many nonverbal messages, such as the identity, intent, and emotion of others . Facial paralysis is known as the inability to move the muscles of the face on one or both sides. This inability can result from nerve damage due to congenital conditions; trauma; or disease, such as stroke, brain tumor, or Bell's palsy.

Peripheral facial paralysis is one of the commonest mononeuropathies. The frequency of idiopathic peripheral paralysis or Bell's palsy varies between 62% and 93% of all cases, with an incidence of between 14 and 25 cases per 100,000 inhabitants per year. Facial Paralysis does not affect only movement of facial activities but also affects the mental health which includes Social Alienation, Depression, Emotional vulnerability due to loss of beauty. It's very important to detect facial paralysis on its early stage so that it can be recovered before the fall of its physical as well as mental damage.

FACE recognition is an important research problem spanning numerous fields and disciplines. This because face recognition, in additional to having numerous practical applications such as bankcard identification, access control, Mug shots searching, security monitoring, and surveillance system, is a fundamental human behaviour that is essential for effective communications and interactions among people. A formal method of classifying faces was first proposed in . The author proposed collecting facial profiles as curves, finding their norm, and then classifying other profiles by their deviations from the norm. This classification is multi-modal, i.e. resulting in a vector of independent measures that could be compared with other vectors in a database.

Facial palsy generally refers to weakness of the facial muscles, inability to move the muscles of the face. When the facial nerve is missing or not working properly, the muscles in the face do not receive the necessary signals in order to function properly. It can be categorized into two types based on the location of the casual pathology:

Central facial palsy: Due to damage above the facial nucleus
Peripheral facial palsy: Due to damage below the facial nucleus, there are different degrees of facial paralysis

Bell's Palsy

Bell's palsy is a condition that causes sudden weakness in the muscles on one side of the face. In most cases, the weakness is temporary and significantly improves over weeks. The weakness makes half of the face appear to droop. Smiles are one-sided, and the eye on the affected side resists closing.Bell's palsy is also known as acute peripheral facial palsy of unknown cause. It can occur at any age. The exact cause is unknown. Experts think it's caused by swelling and inflammation of the nerve that controls the muscles on one side of the face. It could be caused by a reaction that occurs after a viral infection. Symptoms usually start to improve within a few weeks, with complete recovery in about six months. A small number of people continue to have some Bell's palsy symptoms for life. Rarely, Bell's palsy occurs more than once.

Branches

Intracranial branches
The greater petrosal nerve arises from the superior salivatory nucleus of the pons. It provides parasympathetic innervation to several glands, including the nasal glands, the palatine glands, the lacrimal gland, and the pharyngeal gland. It also provides parasympathetic innervation to the maxillary sinus, frontal sinus, sphenoid sinus, ethmoid sinus, and nasal cavity. This also includes taste fibers for the palate via the lesser palatine nerve and greater palatine nerve.

Extracranial branches
Frontal (temporal): Controls your forehead muscles.
Zygomatic: Helps you close your eyes.
Buccal: This allows you to move your nose, blink, and raise your upper lip and corners of your mouth to make a smile.
Marginal mandibular: Draws your lower lip down (like a frown) and travels through your middle ear to help you respond to loud noises.
Cervical: Controls movement in your chin and lower corners of your mouth.

Symptoms

Facial nerve paralysis is characterized by facial weakness, usually only on one side of the face, with other symptoms possibly including loss of taste, movement, and many more. Other signs may be connected to the cause of the paralysis, such as vesicles in the ear, which might occur if the facial palsy is due to shingles.

- decreased tearing
- drooping of the mouth to the affected side
- altered sense of taste
- slurred speech
- Drooling
- sound hypersensitivity on the affected side
- difficulty eating or drinking
- Pain in or near the affected ear
- Loss of hearing
- Increased sensitivity to high-pitched noise
- Nose runs or feels stuffy
- Inability to wrinkle nose
- Difficulty in speaking because of weakness-
- Difficulty eating and drinking
- changes in the level of consciousness
- confusion
- dizziness

Risk factors

There are some factors that may increase your risk of developing Bell's palsy. i.e. pregnancy , diabetes , hypertension (high blood pressure) , obesity , upper respiratory infection, as common cold or the flu.
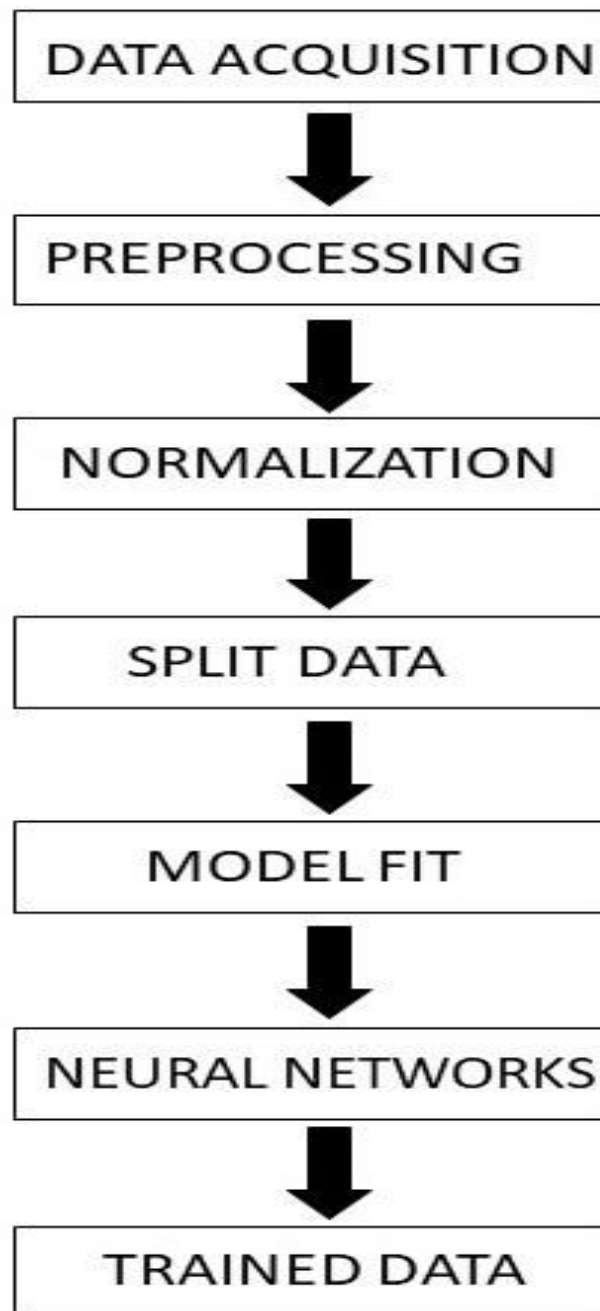
Proposed Model

I have divided this working methodology in 3 parts. First one deals with collecting the dataset and performing initial operations and normalization over the image data. Here we are collecting a dataset of 1000 + images.

Part-1
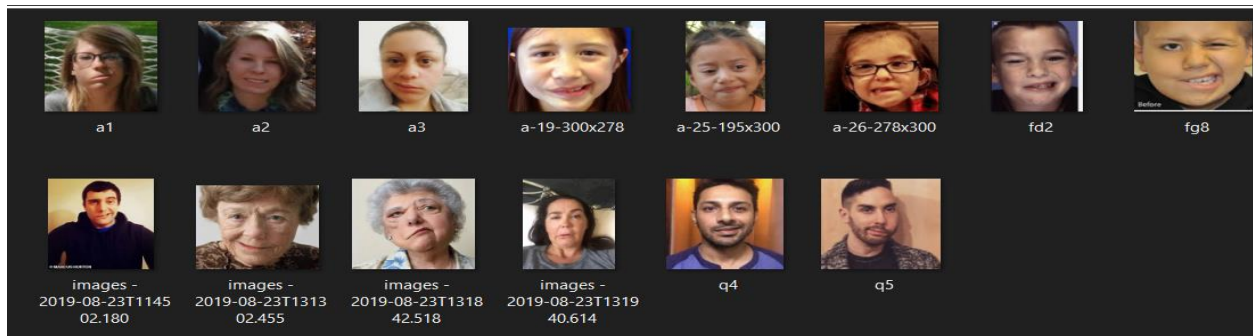
Second part consists of the main process we have to perform in order to get the trained model which we will be using further in our application. Following steps will be performed after part 1 as mentioned above.

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│     TRAINED DATA        │
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Part-2

Neural Network

The marking of important areas of the face, such as the eyes, corners of the mouth, and nose, that are relevant for a variety of tasks, such as face filters, emotion recognition, and pose recognition, using convolutional neural network and computer vision techniques to perform facial Key point detection. Convolutional Neural Networks (CNN) has a deep structure that allows them to extract high-level information and provide better precision when identifying each important point. Convolutional networks are designed to anticipate all points at the same time.

NN frequently require standardized pictures, they should have a constant size, with a normalized range for color ranges. As a result, some pre-processing will be required.

Step -1 Take the Kaggle dataset to train the model

Step - 2 Import required libraries

Step - 3 Set the path for each file of training and testing data,

Step - 4 Unzip the zip files and then load the datasets

Step - 5 After loading the data sets, we can view the data frames by using the pandas' library

Step - 6 Separate and reshape input values

Step - 7 Create a CNN that takes pictures as input and outputs key points

Step - 8 We have written the visualize function and next, we can visualize each image using the function call

Step - 9 It's time to create a training model. To create our CNN model, we'll utilize the Keras framework.

Step - 10 Use initial observations to make changes to your model and decide on the best architecture before you train for many epochs

Step -11 configure the model

Step -12 time to predict the results of the trained model

Conclusion:

In the modern era of evidence-based medicine, the field of facial nerve management has expanded exponentially with critical questions that will help future facial reanimation surgeons refine the approach for patients with acute and long-standing facial paralysis. This project will result with respect to recovery rate of the facial nerve patient, as well as future surgical outcomes. For patients who have had a stroke, getting medical attention quickly can greatly improve the possibility of a full recovery with limited damage to the brain and body. Rehabilitation and preventative measures will vary depending on the type and severity of the stroke. Although it can take six months or more to recover from Bell's palsy, most people will recover completely, with or without treatment.

Follow-up care is vital to make sure optimal healing. It is very important to follow the doctor's post-surgery instructions carefully, like: Avoiding strenuous activity or lifting according to the instructionsWarn the surgery team immediately in the case of any problem or unexpected change Keeping follow-up appointments in one day, one week, and one month after surgery.For patients who have had a stroke, getting medical attention quickly can greatly improve the possibility of a full recovery with limited damage to the brain and body. Rehabilitation and preventative measures will vary depending on the type and severity of the stroke.

Unfortunately, even with all current procedures for therapy, some cases of facial paralysis may never completely go away. For this patient, physical therapy, and eye care can help prevent any further damage and improve quality of life.

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