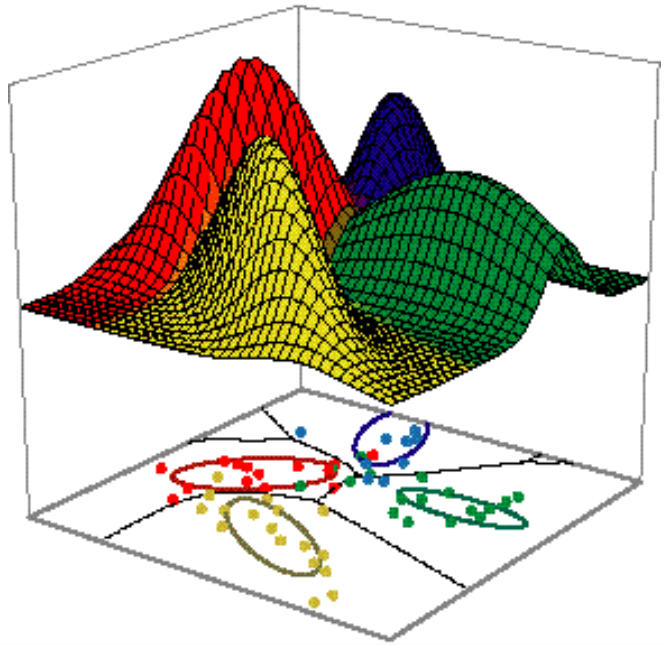
Pattern Classification and Experimental Design

Project Background

Fall 2018



ALS *(Amyotrophic lateral sclerosis)* or Lou Gehrig's disease

- causes death of neurons controlling voluntary muscles with damage to upper and lower motor neurons
- characterized by stiff muscles, muscle twitching, and gradually worsening weakness: tripping, stumbling, "dropped foot" drag
- cause is not known in 90% to 95% of cases; 5–10% of cases are inherited from parents
- differential diagnoses by symptoms; no cure
- maybe any age (peak age 58–63); average survival 2–4 years after onset; death due to respiratory failure
- management: drugs (+2–3 mo), breathing support, physical therapy

[0]source: Wikipedia: ALS

ALS

Huntington's disease, once *chorea*

- inherited disorder that results in death of brain cells
- characterized by mood changes, uncoordinated gait, jerky body movements, rigidity
- symptoms worsen until coordinated movement becomes difficult and the person is unable to talk
- genetic testing; no cure (promising treatments)
- cause is genetic (40+ CAG repeats in HTT alleles): 90% inherited, 10% mutation
- maybe any age (peak age 30–50); average survival 20 years after onset; death due to pneumonia, heart diease, suicide
- management: physical therapy, anti-parkinsonian drugs

[0] source: Wikipedia: Huntingtons disease

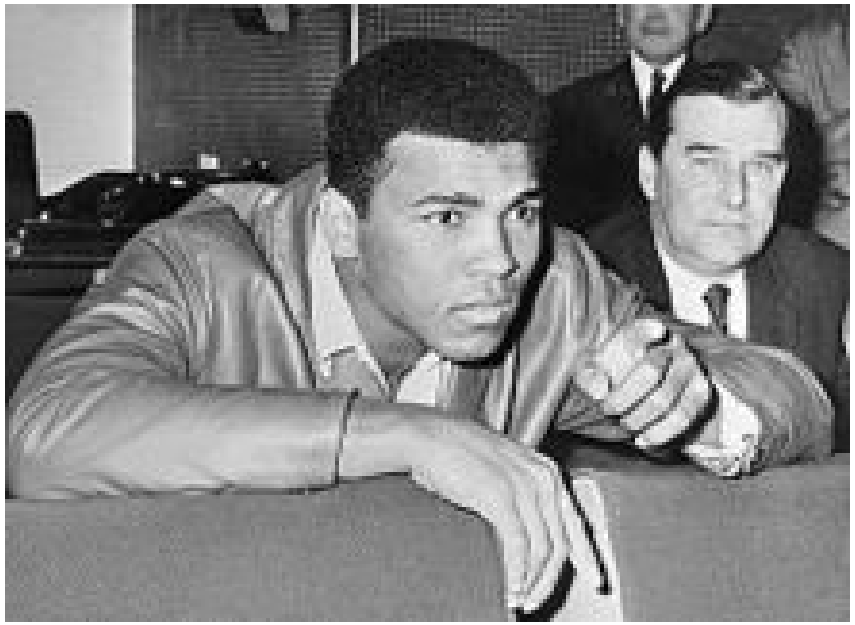
Huntington's disease

Parkinson's disease

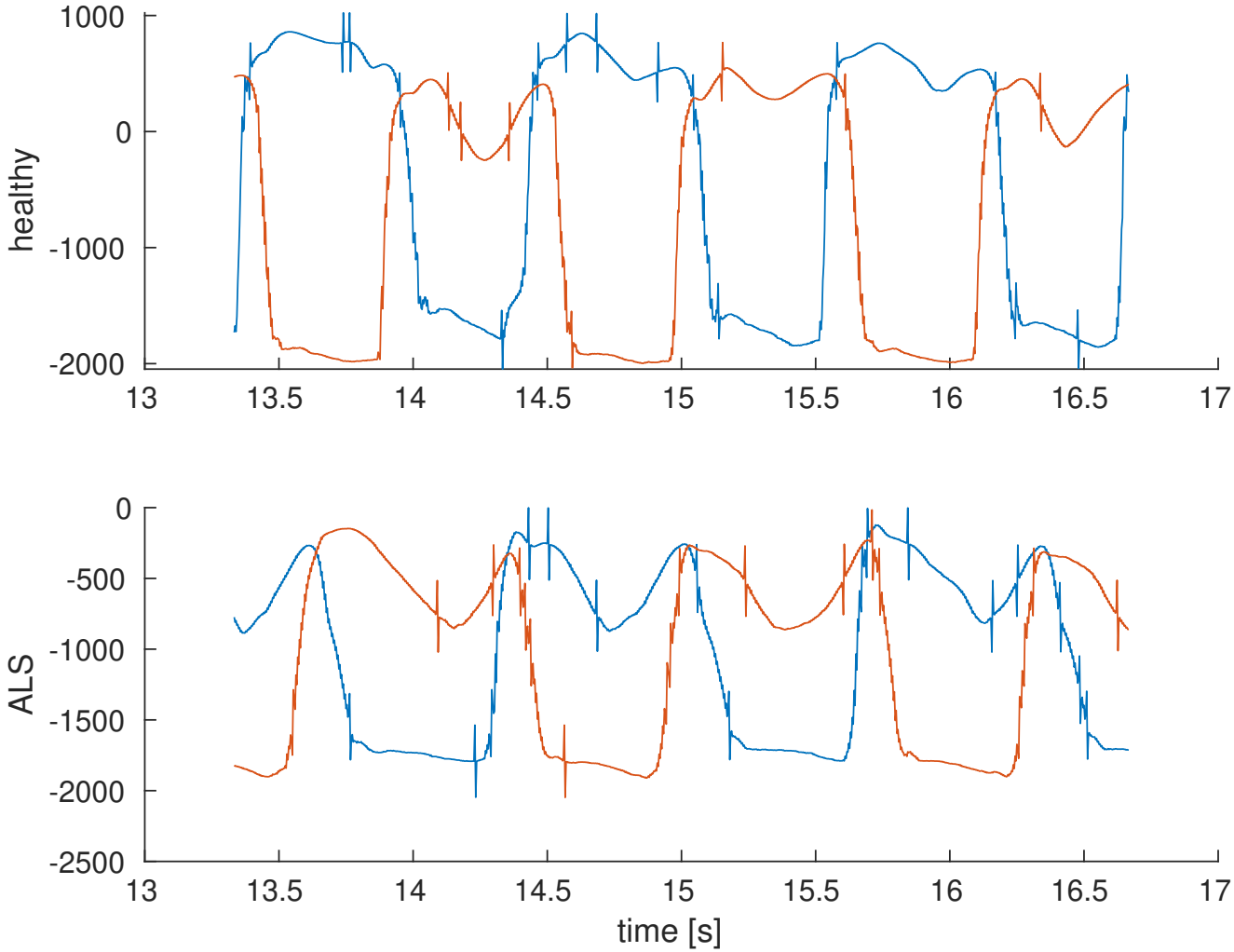
- long-term degenerative disorder of the central nervous system that mainly affects the motor system
- tremors at rest, rigidity, slowness of gait *bradykinesia*, postural instability, *festination*, behavioural changes, dementia, sleep
- differential diagnosis by symptoms; no cure
- cause is unknown (brain cell death): suspected genetic and environmental factors (pesticides, head trauma)
- maybe any age (peak age 60); average survival 7–14 years after onset; death due to aspiration pneumonia, dementia
- management: anti-parkinsonian drugs — levodopa (L-DOPA), dopamine agonists

[0] source: Wikipedia: Parkinson's disease

Parkinson's disease



Time Series


1000
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-1000
-2000
healthy
13
13.5
14
14.5
15
15.5
16
16.5
17
0
-500
-1000
-1500
-2000
-2500
ALS
time [s]

Gait Analysis

- Step length
- Stride length
- Cadence
- Speed
- Dynamic Base
- Progression Line
- Foot Angle
- Hip Angle
- Squat Performance

[0] source: Wikipedia: gait analysis