Institución Universitaria
Reacreditada en Alta Calidad

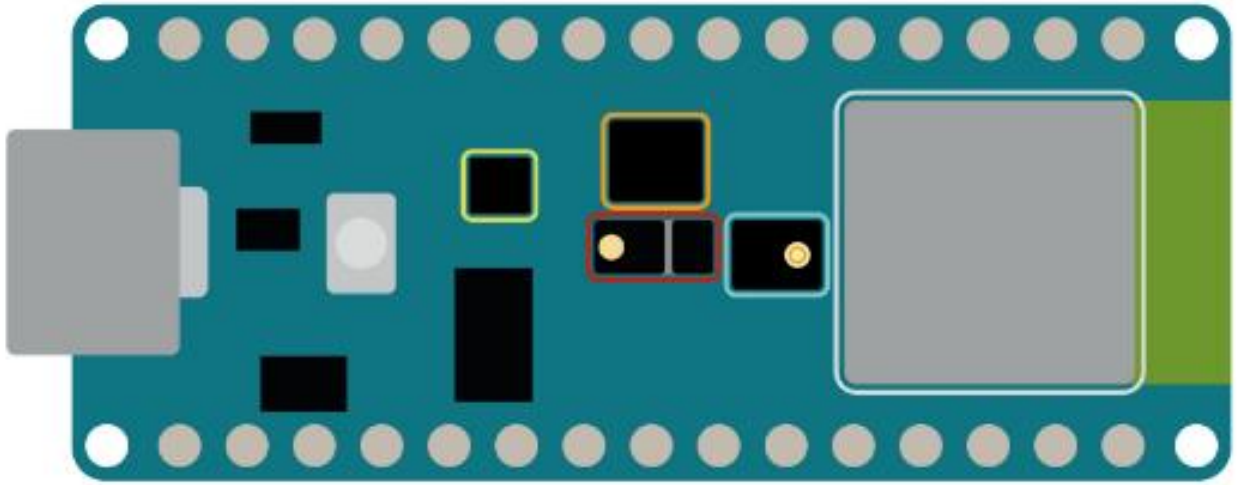
Extracción de Caracteristicas

INTEGRACIÓN DE ML EN EMBEBIDOS Y EDGE COMPUTING

Somos Innovación Tecnológica con Sentido Humano

Alcaldía de Medellín

Arduino nano 33 BLE sense



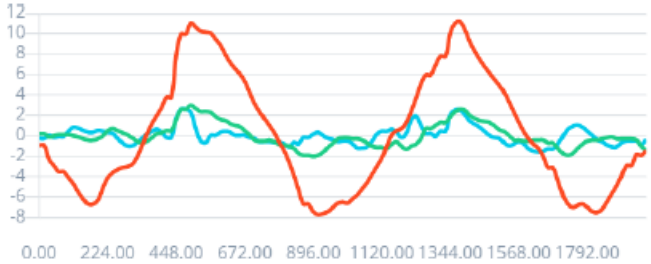
- Color, brightness, proximity and gesture sensor
- Digital microphone
- Motion, vibration and orientation sensor
- Temperature, humidity and pressure sensor
- Arm Cortex-M4 microcontroller and BLE module

Contenido

1. Acelerómetros
2. Audio
3. Imágenes

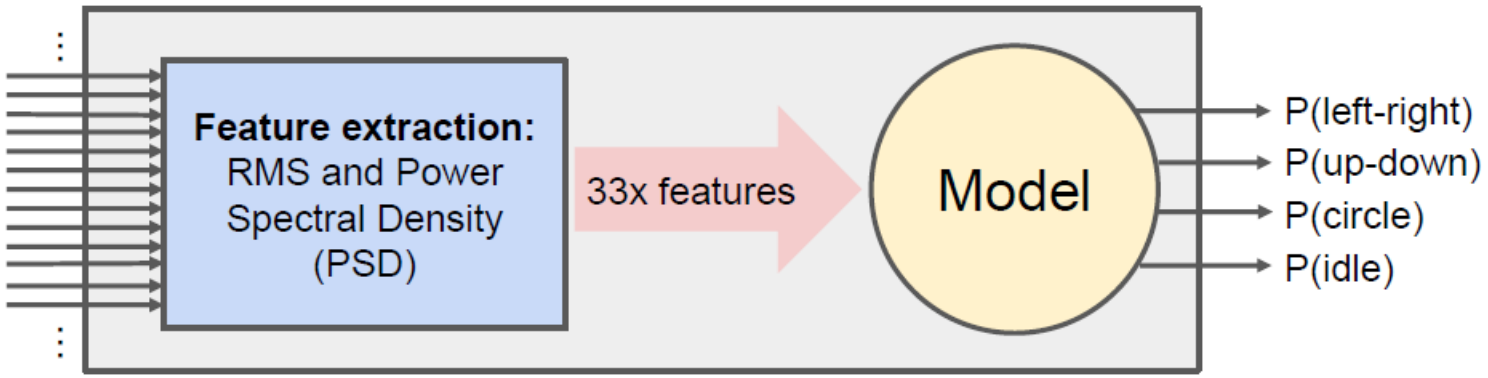
Medidas por ventana

Sample accelerometer for 2 seconds



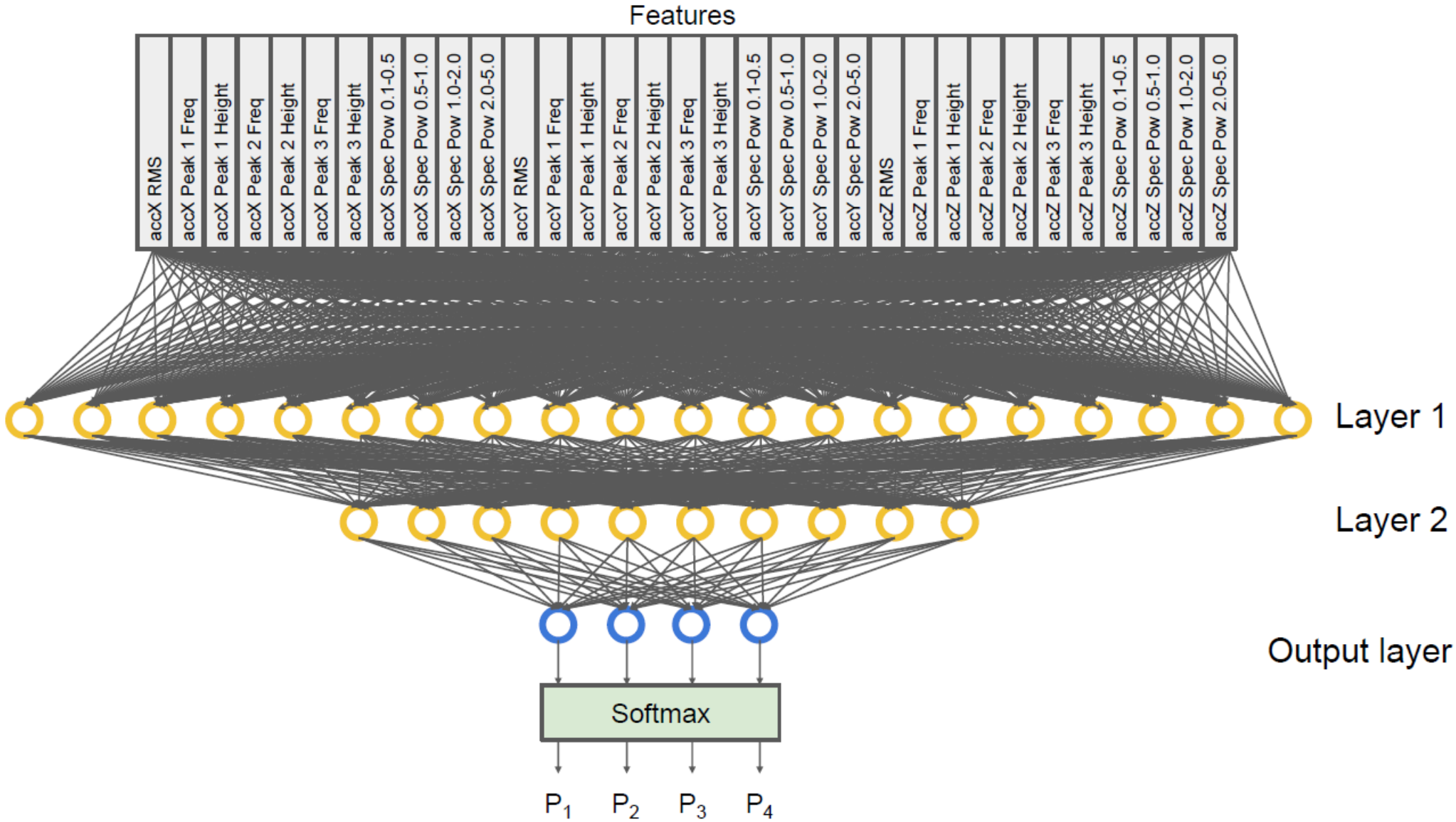
62.5 Hz sampling for 2 seconds with 3 axes = 375 values

Edge Impulse library



375 raw values

Clasificador – Red Neuronal MLP



Matriz de confusión

Confusion Matrix

Actual Label \ Predicted Label	Circle	Idle	Left-Right	Up-Down
Circle	205	10	1	46
Idle	6	199	0	32
Left-Right	9	17	223	34
Up-Down	21	8	3	186
Per-class accuracy	0.907	0.927	0.936	0.856
F1 scores	0.845	0.815	0.892	0.721

Total accuracy: 0.813

F1 average: 0.818

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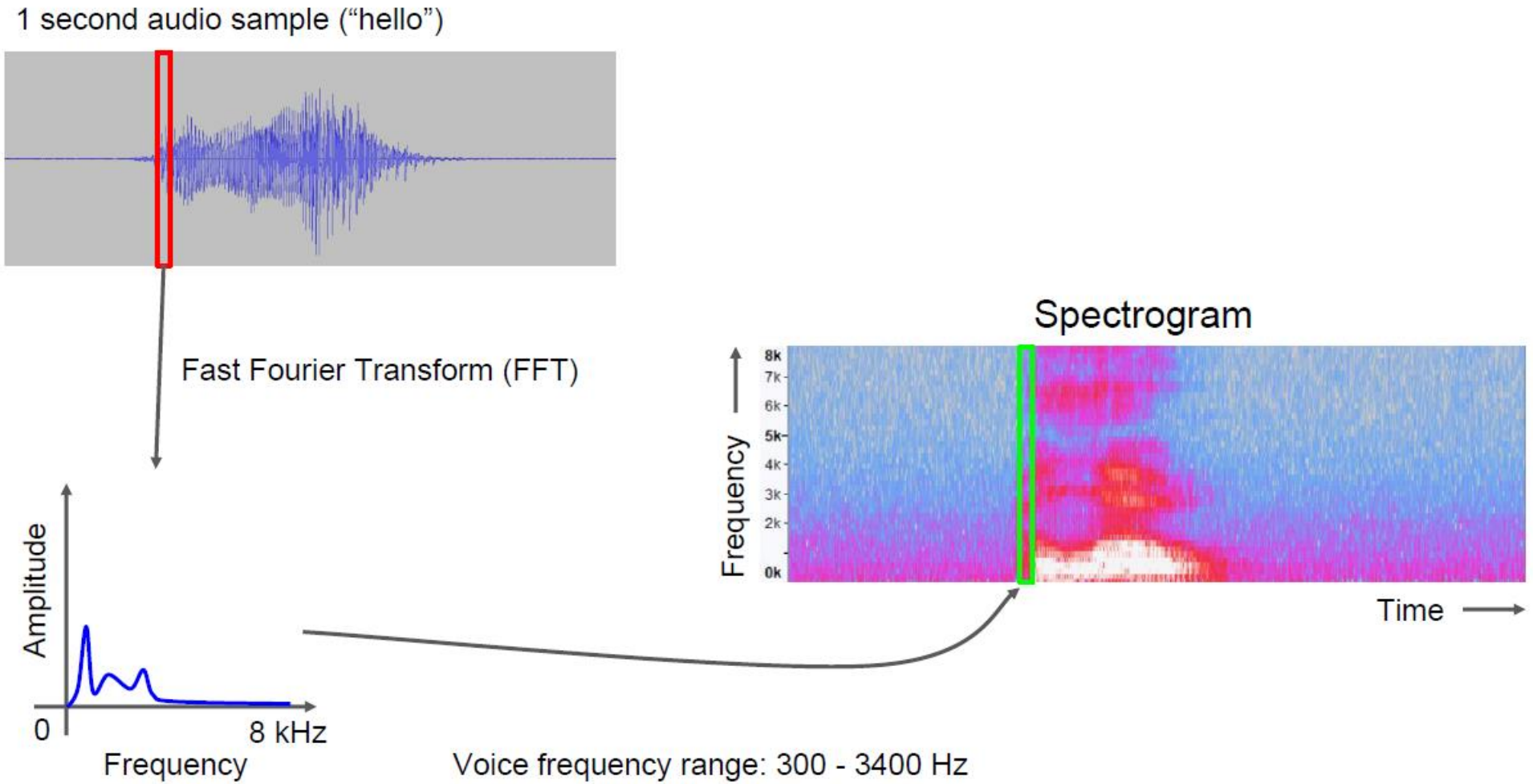
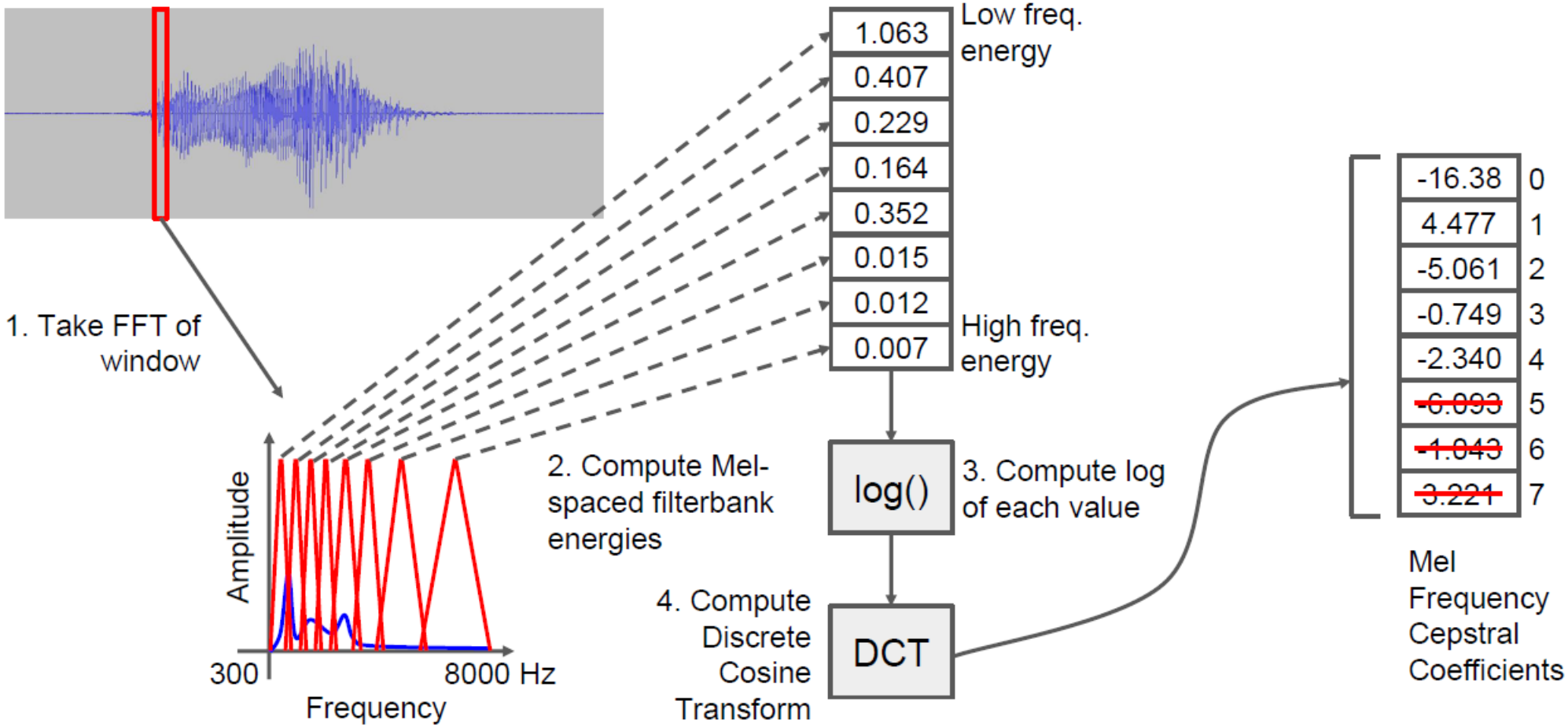
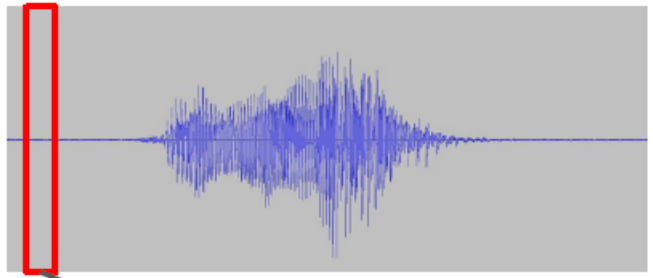
Transformada de Fourier



Coeficiente Ceptrales de Mel



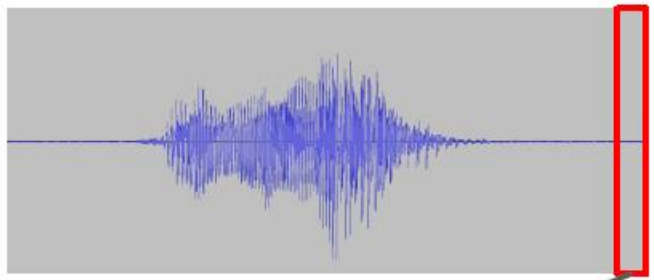
Analisis por secuencia



MFCCs

	0	1
12	-1.043	-0.816
⋮	⋮	⋮
3	0.5467	0.442
2	0.0476	0.836
1	0.153	-0.671
0	-1.173	0.462

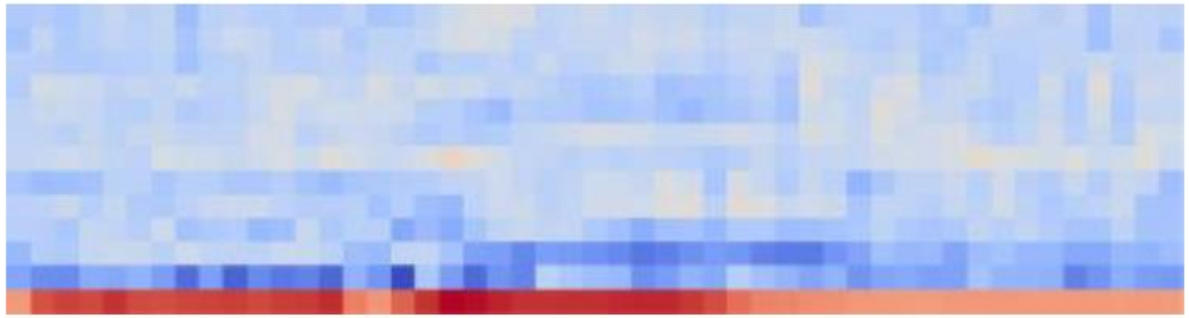
Analisis por secuencia



MFCCs

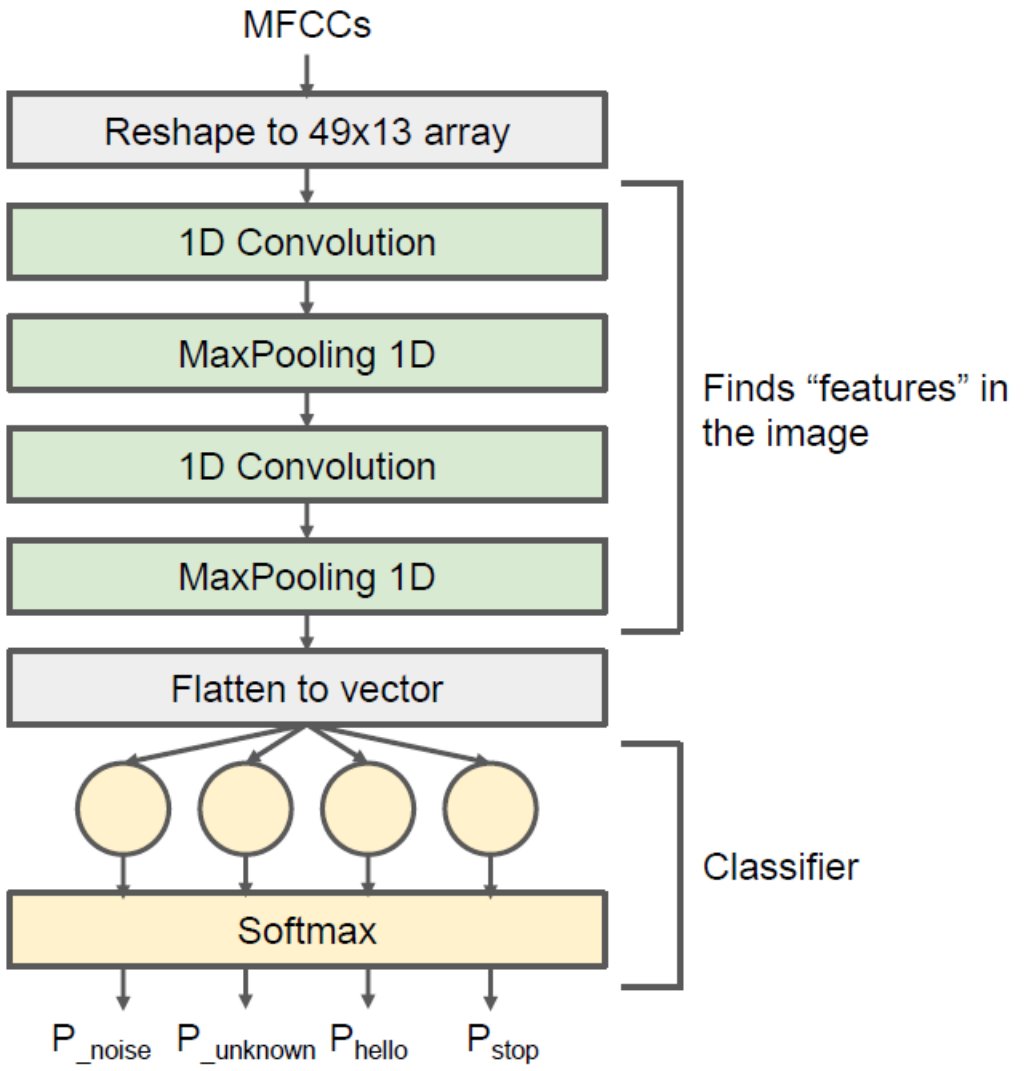
	0	1	...	48
12	-1.043	-0.816	...	-0.184
3	0.5467	0.442	...	-0.523
2	0.0476	0.836	...	0.185
1	0.153	-0.671	...	-0.248
0	-1.173	0.462	...	-1.218

"stop"



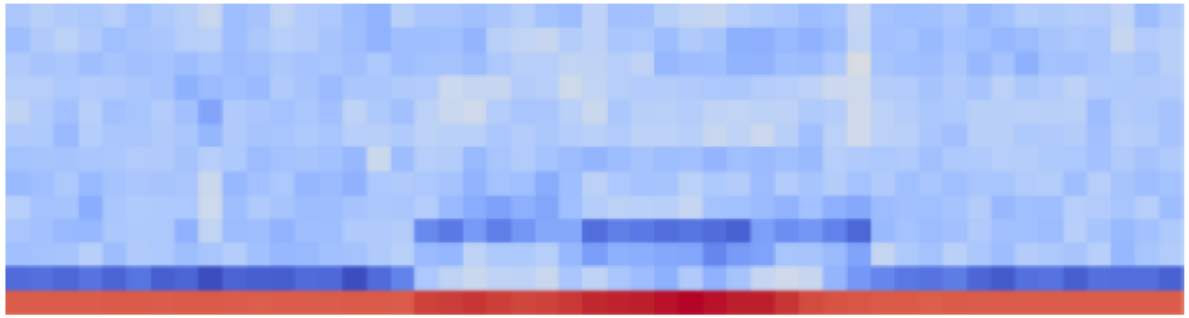
"hello"

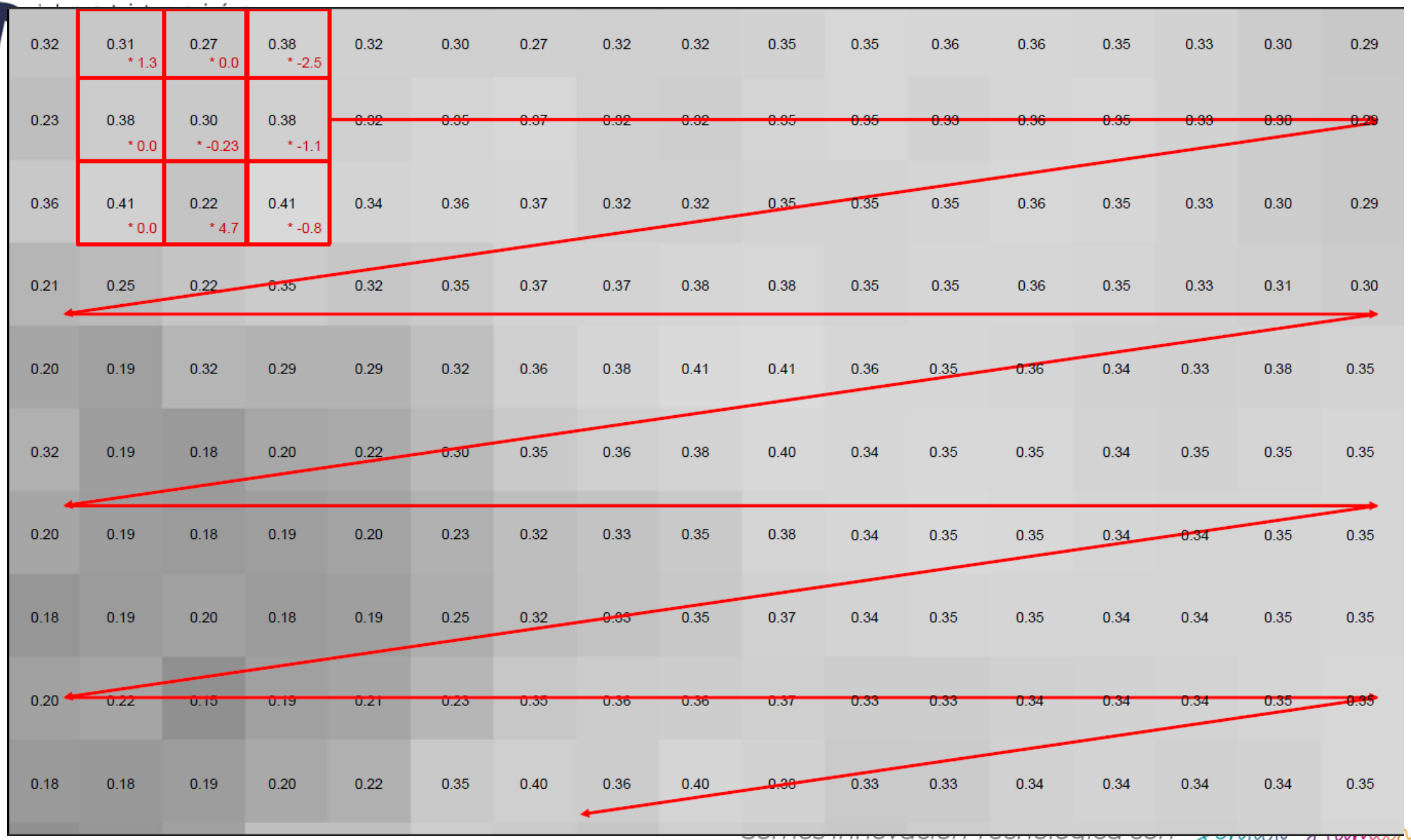
Modelo ML

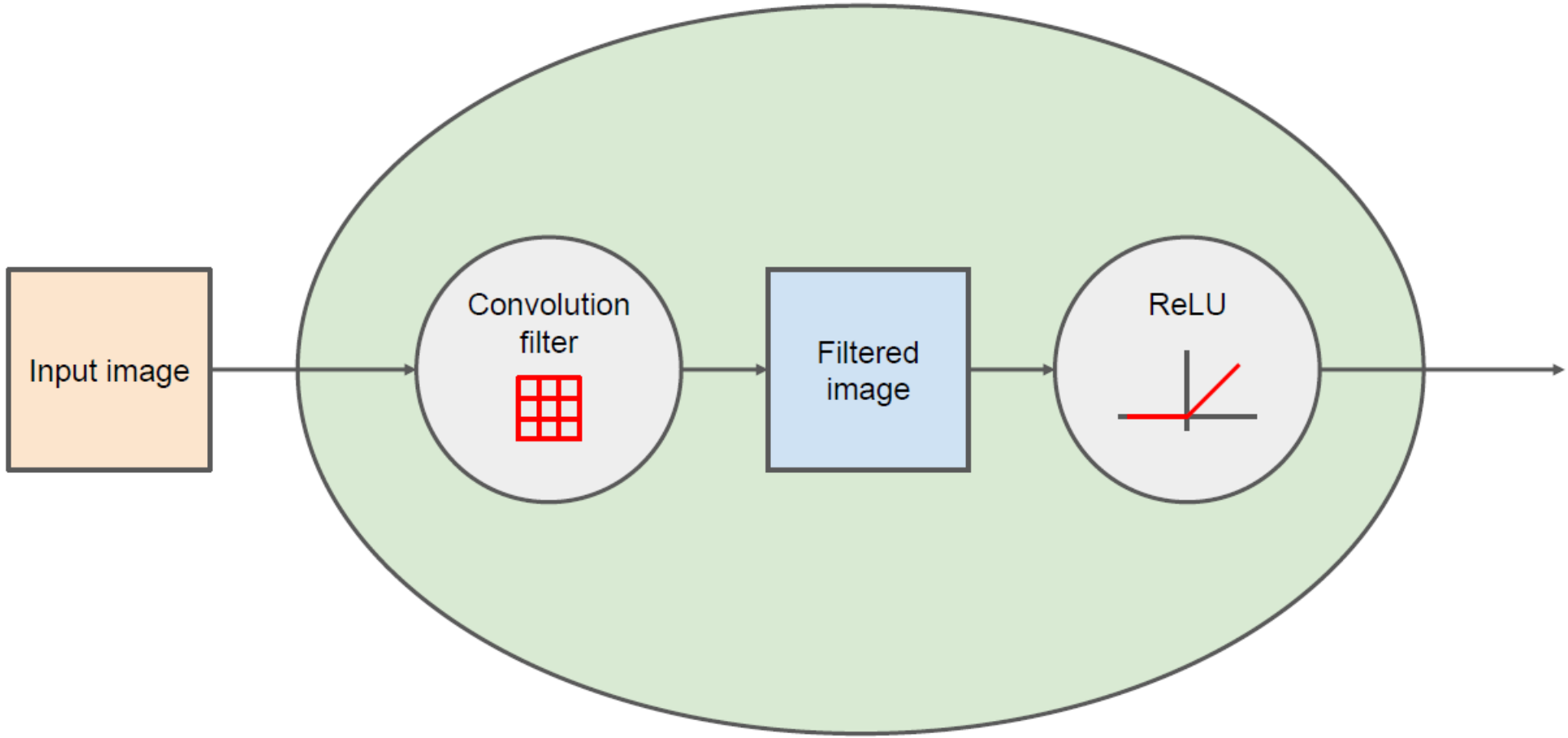


Espectrograma como una imagen

"hello"

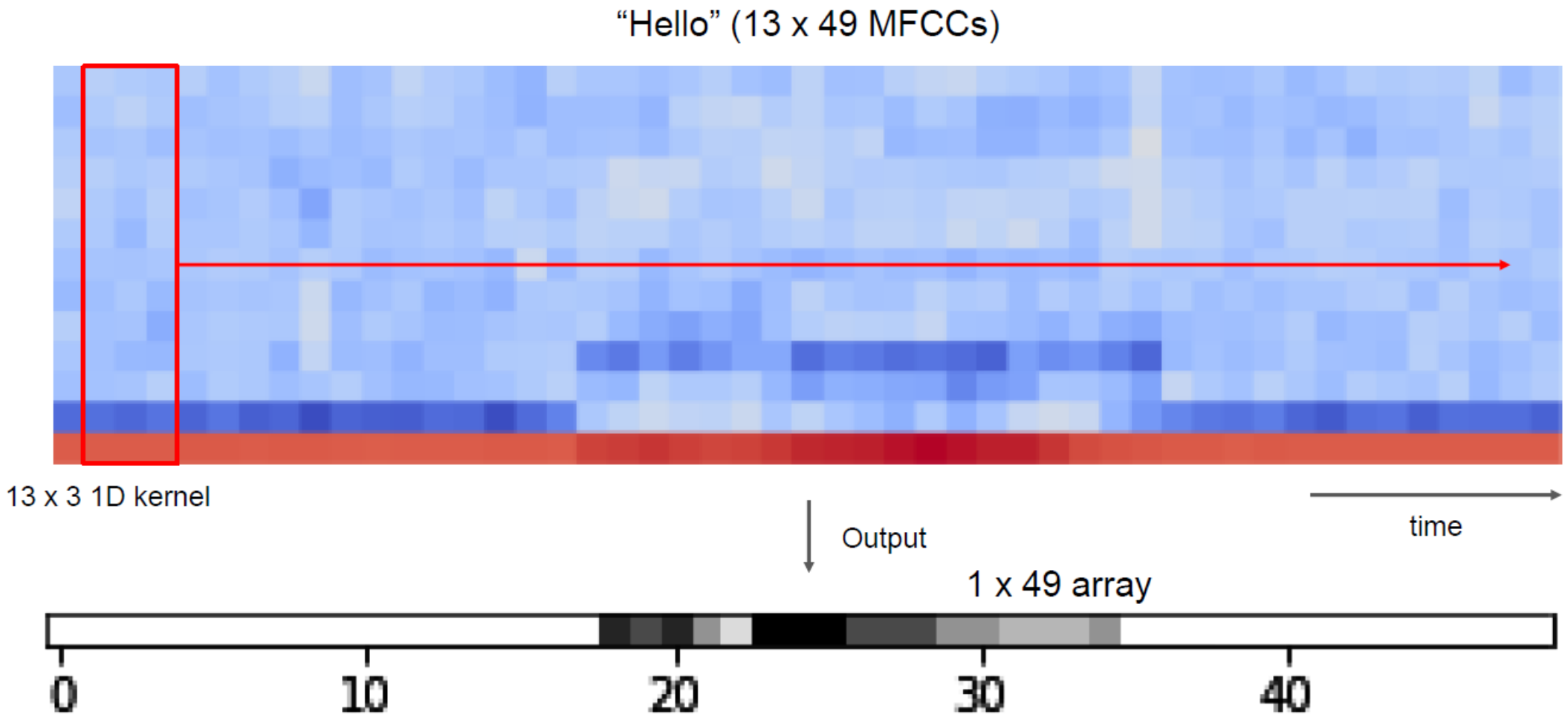






Single node in convolution layer

Single CNN



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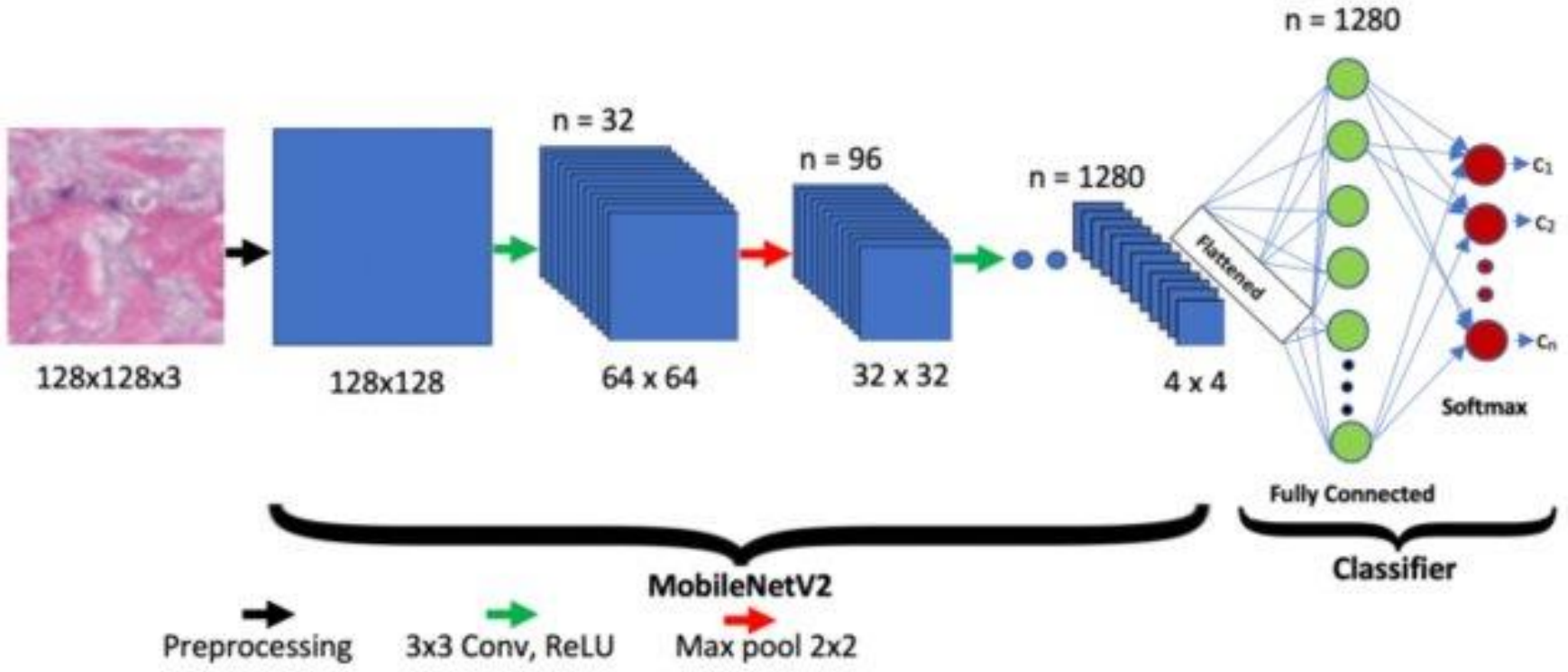
Mobile Net V2



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¡Gracias!

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