NPTEL ONLINE CERTIFICATION COURSES

Course Name: Deep Learning

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Department : E & ECE, IIT Kharagpur

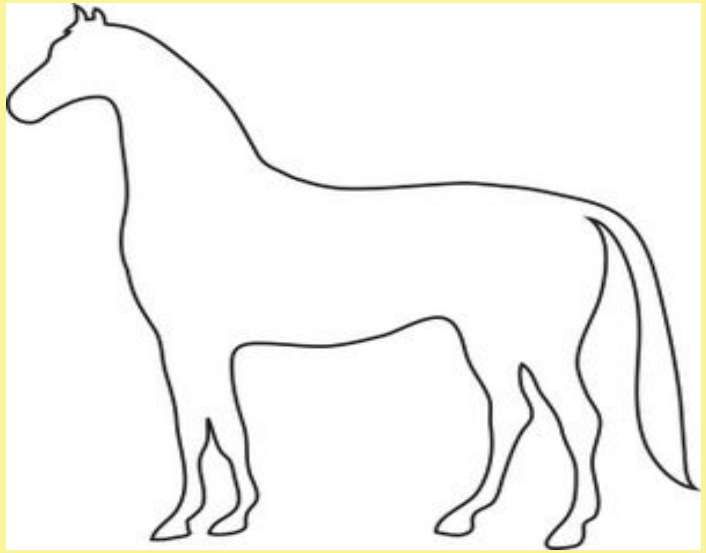
Topic

Lecture 03: Region Descriptors

Descriptors/ Feature Vectors

Image Source: Internet

Descriptors/ Feature Vectors



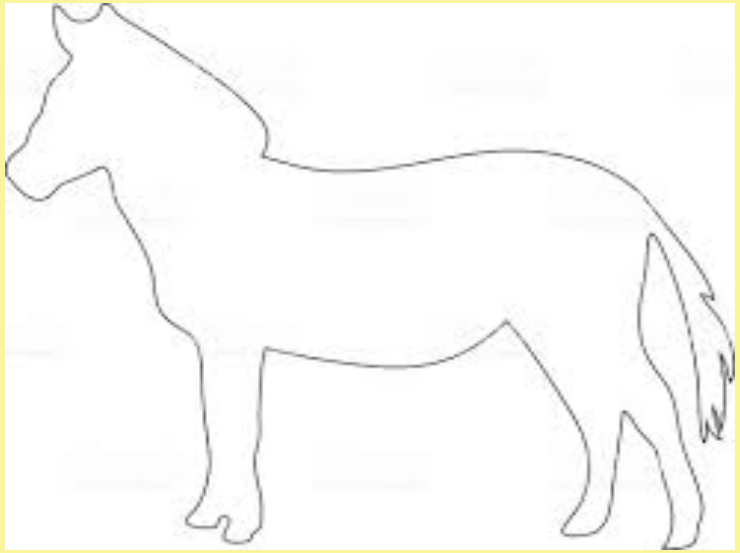


Image Source: Internet

Descriptors/ Feature Vectors

Image Source: Internet

CONCEPTS COVERED

Concepts Covered: Descriptors/ Features

- Visual Signals
  - Boundary Features
  - Region Features
- Audio Signals

Region Descriptors

Intensity Descriptor

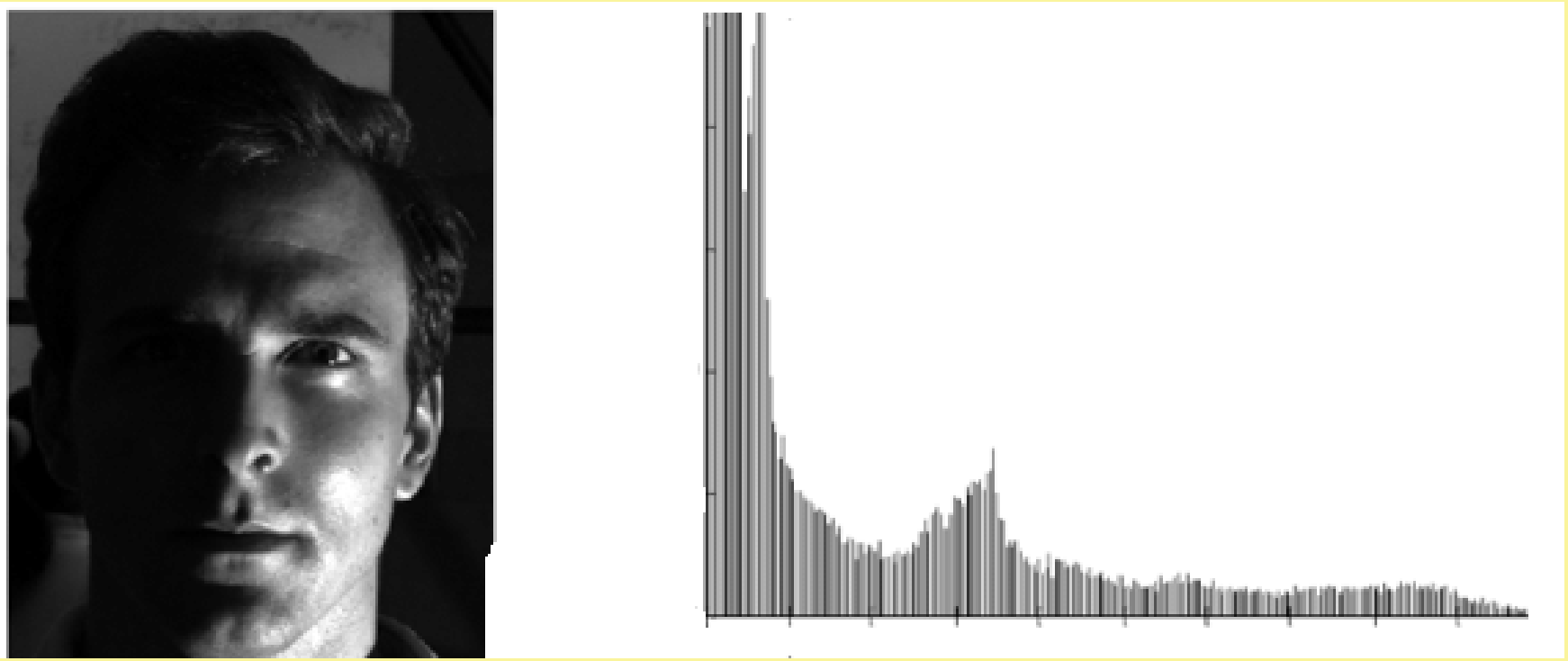


Image Source: Internet

Intensity Descriptor

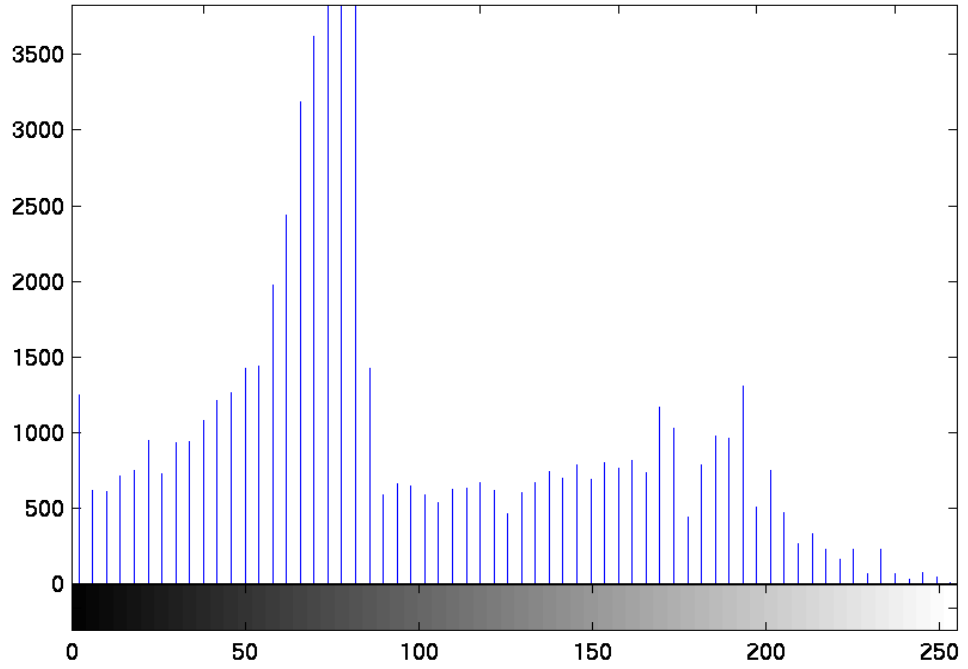


Image Source: Internet

Colour Feature

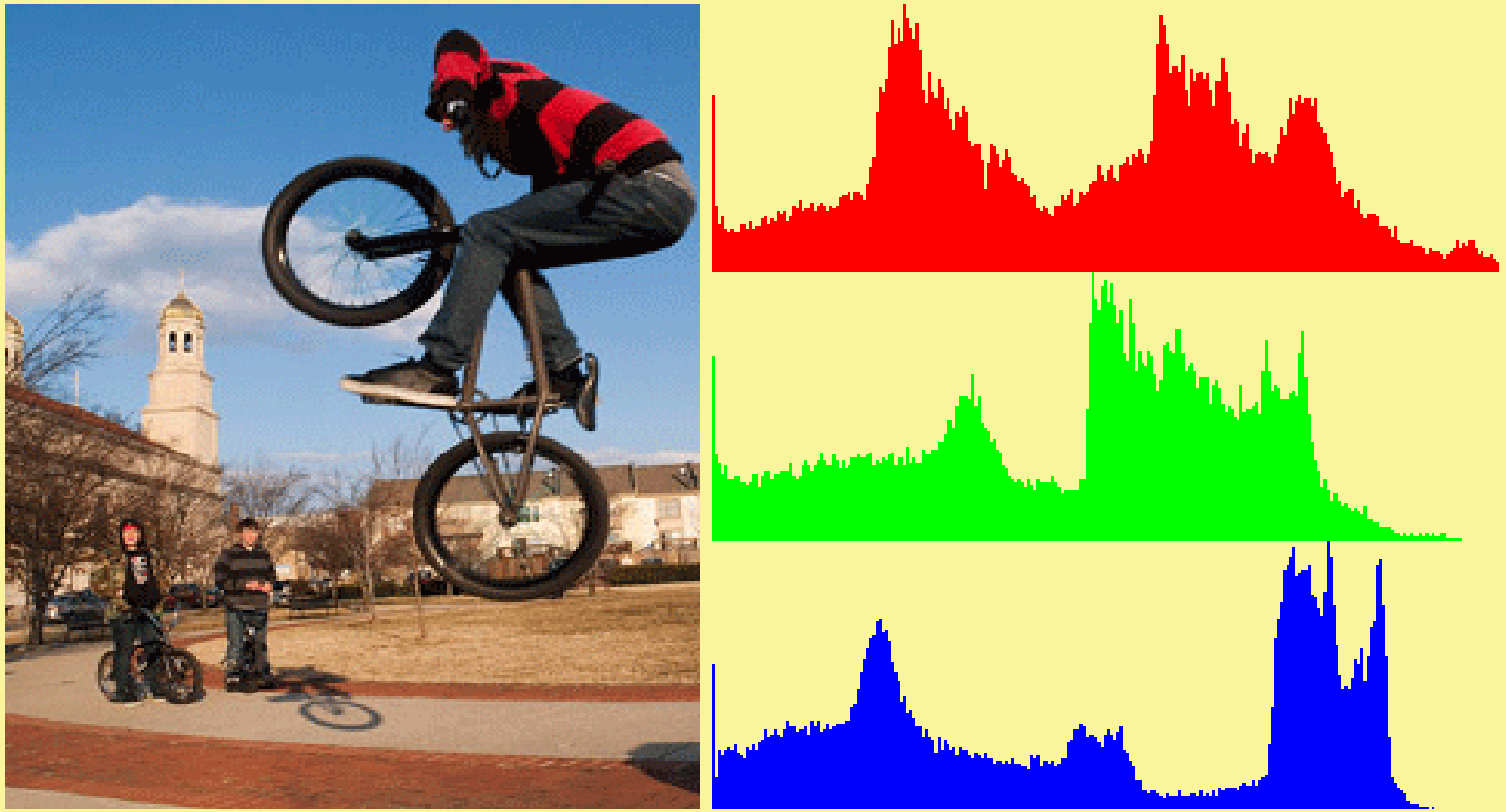
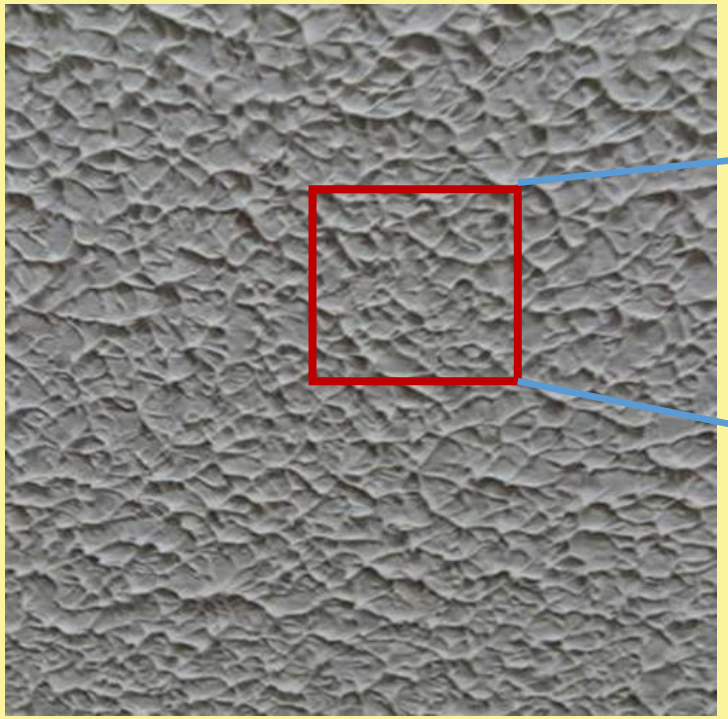


Image Source:https://billmill.org/the_histogram.html

Texture Descriptors

Pixel Domain/ Co-occurrence Matrix



150	100	115	109	112	100	145	140
110	112	120	135	125	120	132	133
152	99	129	130	122	135	98	100
147	138	142	95	108	136	110	125
99	127	149	138	138	129	108	129
128	125	139	115	120	145	137	131
146	159	150	130	147	139	143	127
140	120	128	98	100	106	115	119

Pixel Domain/ Co-occurrence Matrix

10	9	7	9	5	8	11	9
6	5	15	12	4	6	3	2
9	3	2	10	6	8	4	5
8	2	4	3	7	5	6	1
2	0	11	8	10	9	8	2
8	4	7	1	6	0	7	6
2	3	8	9	11	6	3	9
7	2	8	8	6	12	6	7

Co-occurrence matrix based descriptors

Maximum Probability $\max_{i,j}(c_{ij})$

Element Difference Moment $\sum_i \sum_j (i-j)^k C_{i,j}$

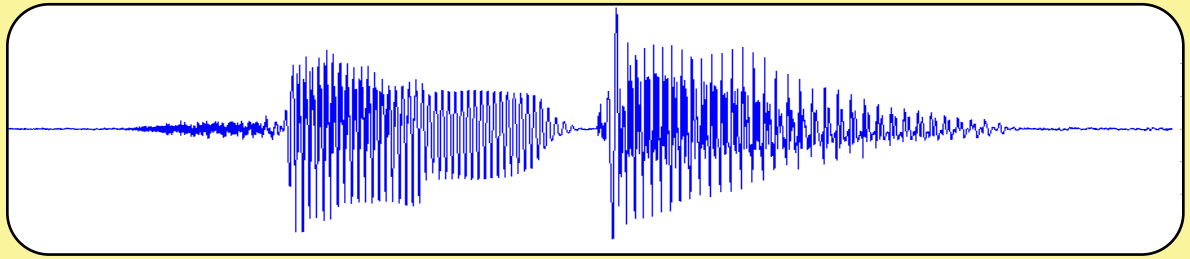
Inverse Element Difference Moment $\sum_i \sum_j C_{i,j} / (i-j)^k \qquad i \neq j$

Uniformity $\sum_i \sum_i C_{ij}^2$

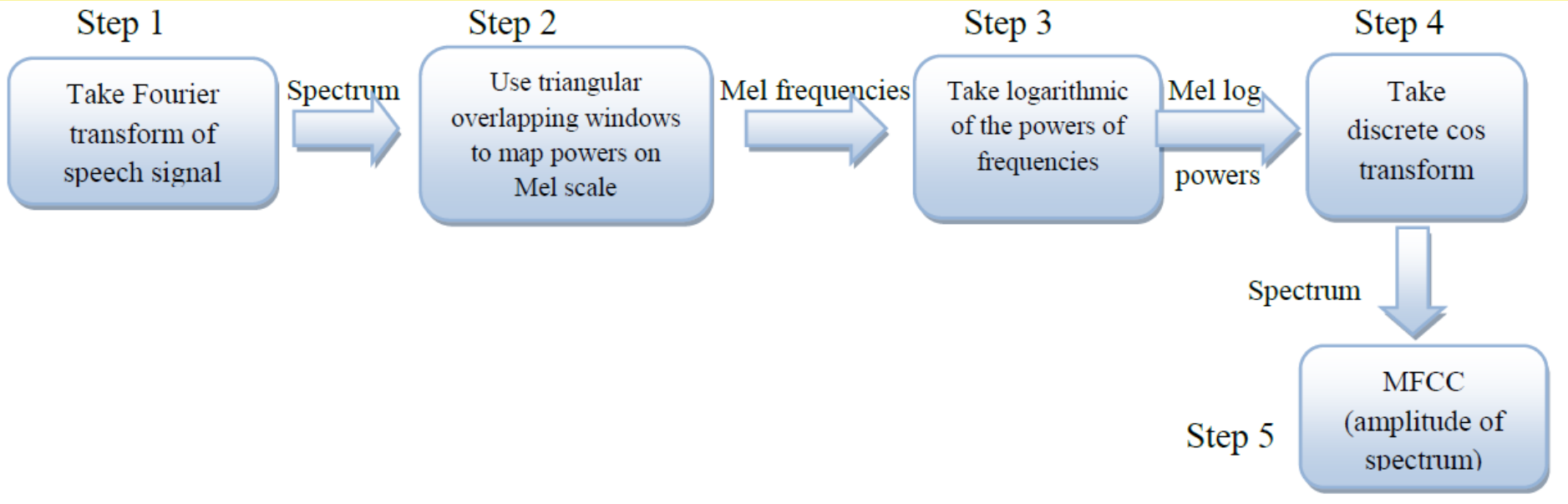
Entropy $-\sum_i \sum_j c_{ij} \log_2 C_{ij}$

Audio

Time Domain Feature - LPC



Spectral Domain- MFCC



Traditional Machine Learning vs. Deep Learning

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Thank you