

# Texture Analysis and CAD for Prostate MRI

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## Outline

- Prostate Cancer
- Texture Analysis
- Computer Aided Diagnosis
- Results and Conclusions

## Prostate Cancer

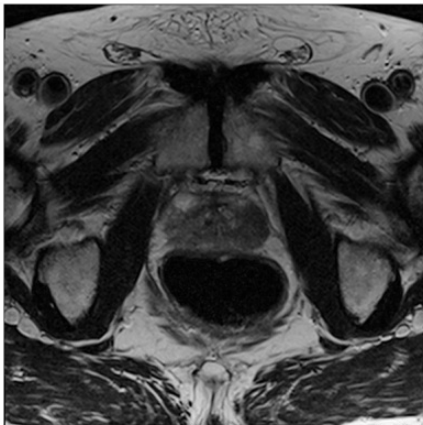
- Highly prominent in the elderly male population (>70% in 70 year olds).
- Very low mortality caused specifically by prostate cancer, especially for low grade tumours.

## Prostate Cancer

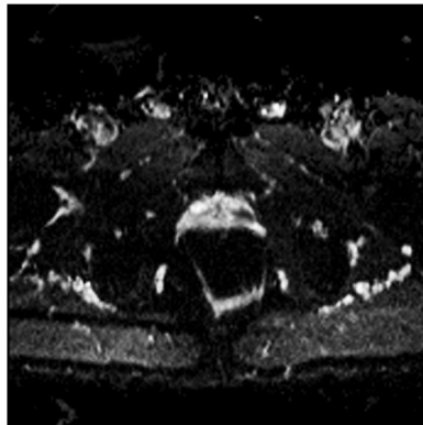
- Diagnosed through digital rectal examination and/or PSA-assay followed by biopsy.
- Systematic and random errors, most of anterior gland is inaccessible.
- MRI provides information to avoid those limitations.

# Prostate Cancer

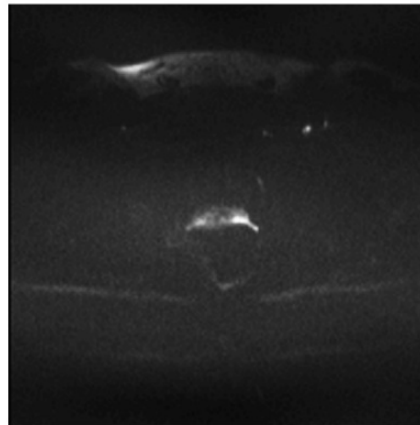
- Multimodal MRI examples.



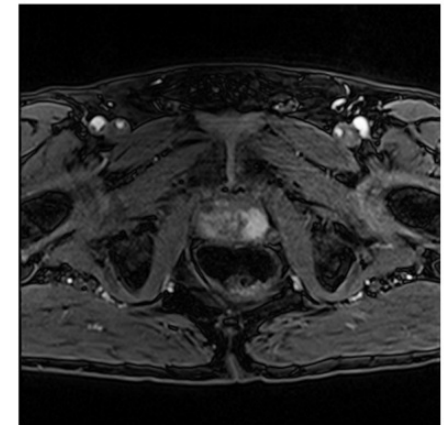
T2w



ADC map



DWI b1400



DCE wash-in

## Texture Analysis

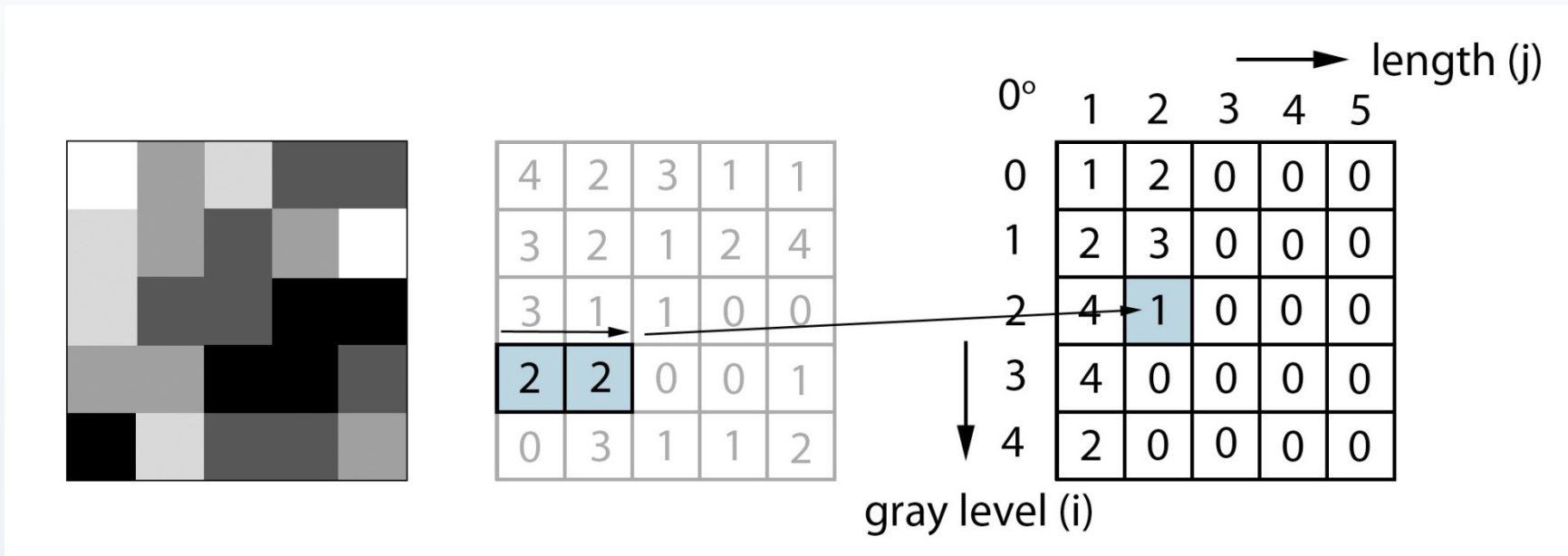
- Extraction of information from spatial patterns.
- Quantisation of texture, such as inhomogeneity or patchiness.
- Huge number of texture features developed.

## Texture Analysis

- Markovian Co-Occurrence Matrix
- Run-Length Matrix
- Wavelet Decomposition
- Fractal Capacity Dimensions

# Texture Analysis

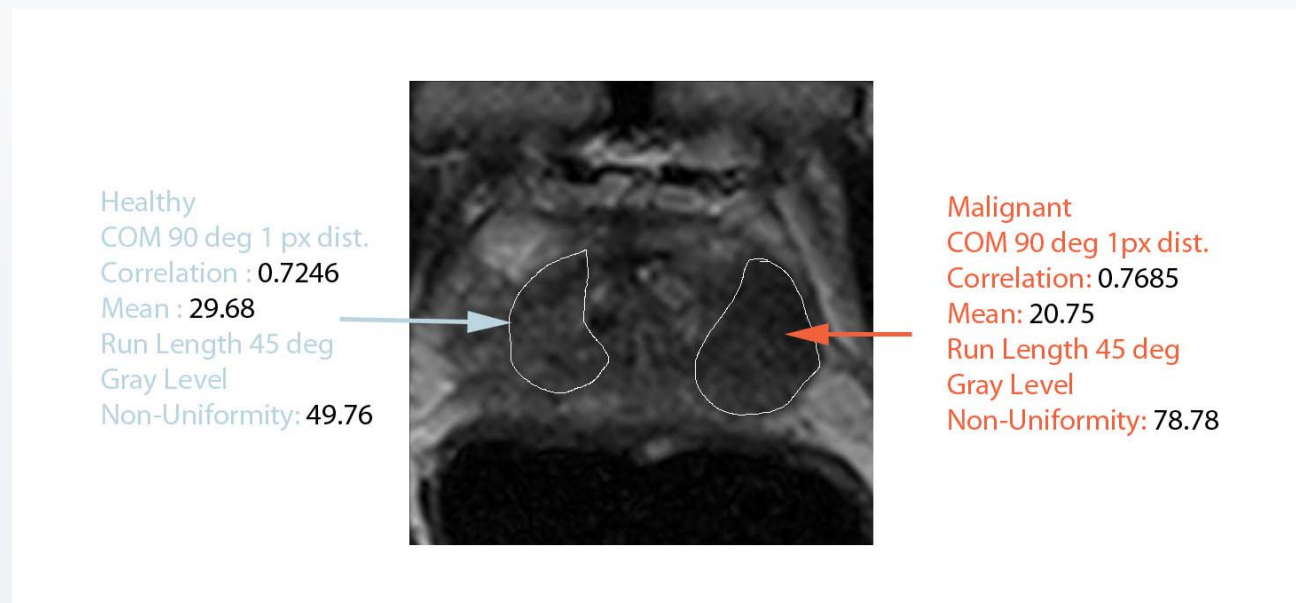
- Run-Length Matrix





# Texture Analysis

- Example of two regions of peripheral zone prostate tissue.



# Computer Aided Diagnosis

- CAD attempts to make some classification of an input with prior knowledge. Mimics human behaviour.
- Support-Vector Machines is one common algorithm.

# Results

- Confusion matrices for all data sets.

		Prediction	
		M	H
Ground Truth	M	9	5
	H	4	13

Texture Features  
 TPR : 0.64  
 FPR : 0.24  
 Accuracy : 0.71

Texture set (18 features)  
 31 samples

		Prediction	
		M	H
Ground Truth	M	6	1
	H	0	7

MRI Features  
 TPR : 0.86  
 FPR : 0  
 Accuracy : 0.93

MRI data set (15 features)  
 14 samples

		Prediction	
		M	H
Ground Truth	M	5	2
	H	0	7

Combined  
 TPR : 0.71  
 FPR : 0  
 Accuracy : 0.86

Combined set (33 features)  
 14 samples

## Conclusions

- Presentation of analysis results to radiologists.
- Limited information contained in texture features.  
No indication of improved discriminatory power.
- Likely to be more useful information in ADC and DCE image data.