



UNIVERSITÀ
DEGLI STUDI
DI PADOVA



DIPARTIMENTO
DI INGEGNERIA
DELL'INFORMAZIONE

Compressione di immagini tramite autoencoder

stato dell'arte e sviluppi futuri

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1. Compressione
2. Metodi tradizionali
3. Metodi con intelligenza artificiale
4. Risultati Sperimentali
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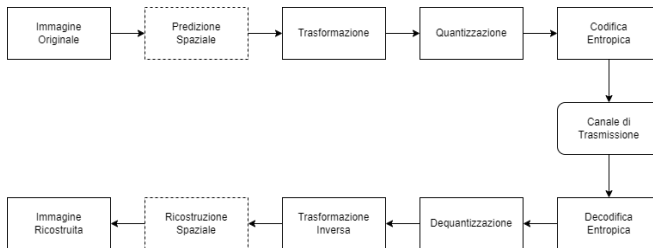


Figure: Blocchi funzionali principali di un framework lossy [1], con l'aggiunta di un quarto blocco per i metodi recenti

I metodi di codifica tradizionale analizzati in questo studio sono i seguenti

- JPEG [2]
- JPEG2000 [3]
- BPG [4]
- VVC [5]

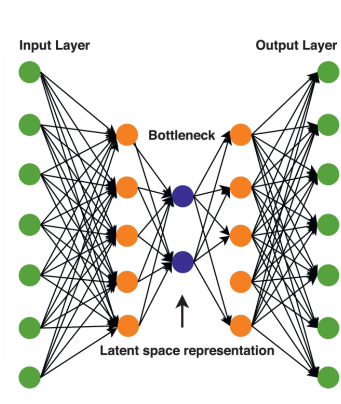


Figure: Schema generico di un autoencoder

I metodi di codifica con intelligenza artificiale analizzati in questo studio sono i seguenti

- Ballé et al. [6]
- Cheng et al. [7]
- Wang et al. [8]

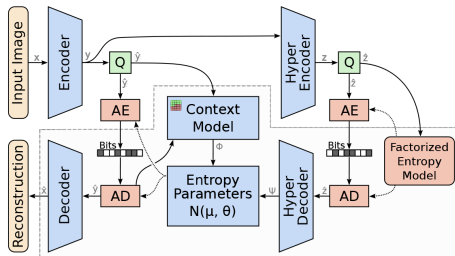


Figure: Diagramma rete Ballé 2018 et al., immagine presa dal documento [6]

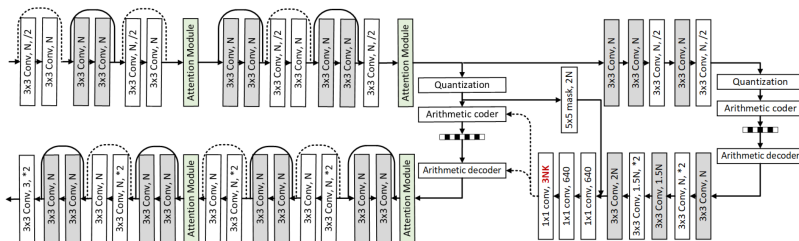


Figure: Diagramma rete Cheng 2020 et al., immagine presa dal documento [7]

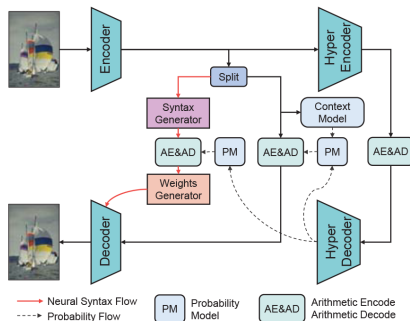


Figure: Diagramma rete Wang 2022 et al., immagine presa dal documento [8]

Esempi di compressione di un immagine del dataset Kodak [9] con le tecniche presentate



Figure:	Figure:	Figure:	Figure:	Figure:	Figure:	Figure:
Originale	JPEG	JPEG2000	BPG	VVC	Ballé	Cheng
11.117bpp	0.167bpp	0.137bpp	0.103bpp	0.061bpp	0.060bpp	0.056bpp

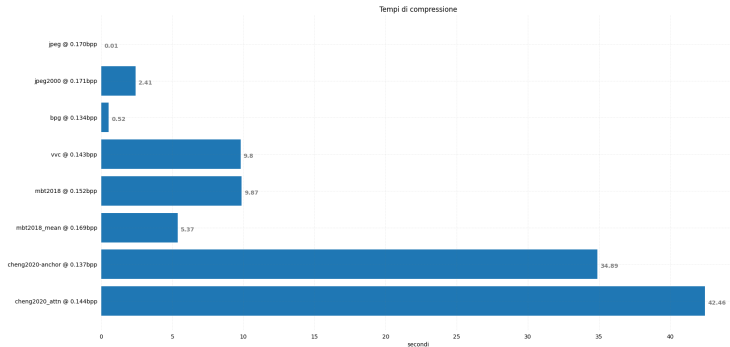


Figure: Tempi di compressione a 0.16 bpp

Tempi di Compressione

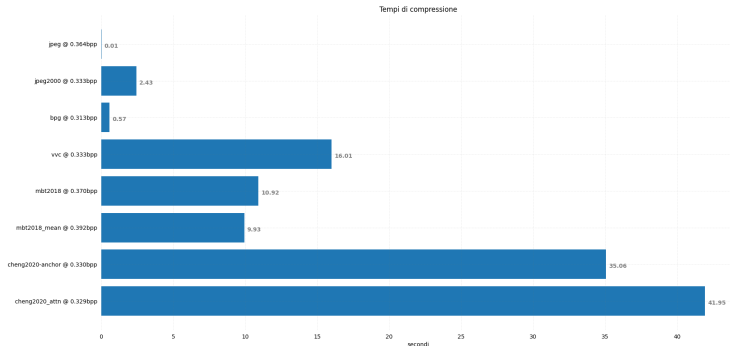


Figure: Tempi di compressione a 0.34 bps

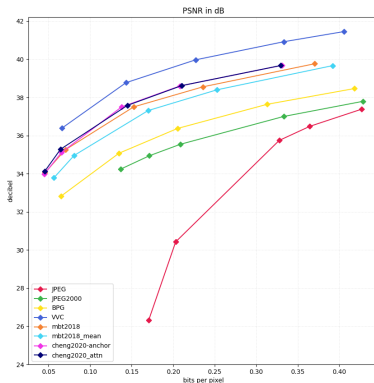


Figure: Grafico del PSNR, punti corrispondenti alla media delle metriche sulle 24 immagini del dataset

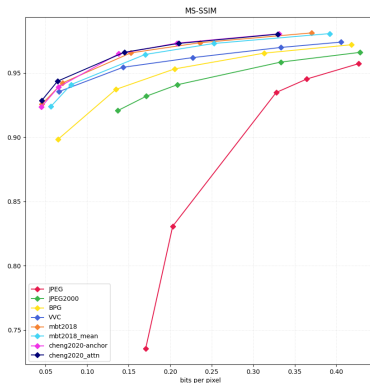


Figure: Grafico dell'MS-SSIM [10], punti corrispondenti alla media delle metriche sulle 24 immagini del dataset

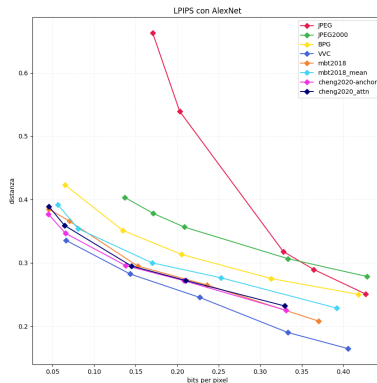


Figure: Grafico LPIPS [11] con AlexNet, punti corrispondenti alla media delle metriche sulle 24 immagini del dataset

Durante la ricerca delle informazioni per la stesura di questa tesi ci siamo imbattuti in due lavori molto interessanti

- StructuralADAM [12]
- SmallCAE [13]

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