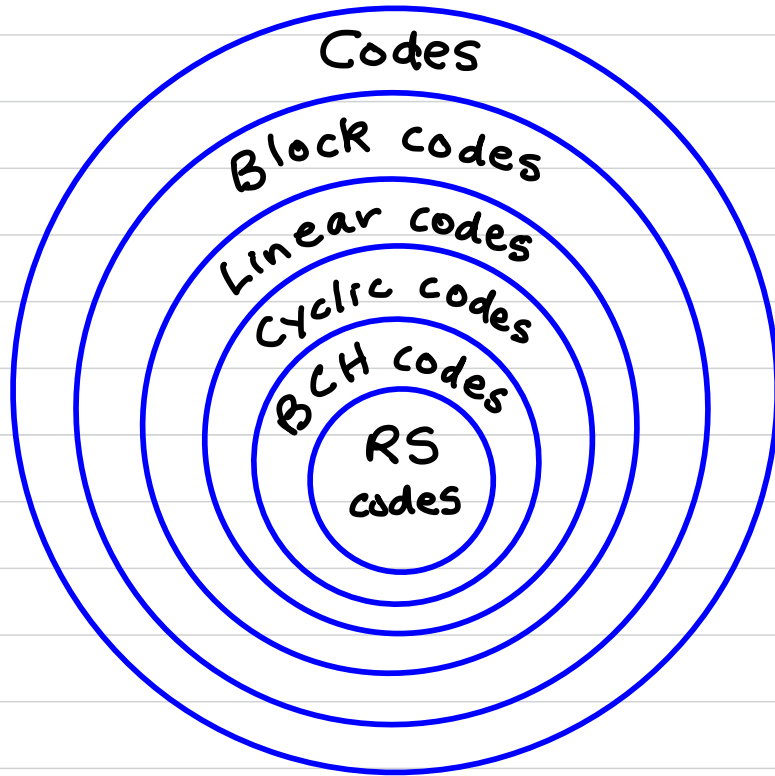


V8 WRAP-UP

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CODING THEORY 2

- LDPC codes
 - Low Density Parity Codes
 - Good for soft-decision decoding
 - Used in digital TV, wireless comm., optical communications, etc.
- Concatenation codes
 - BCH/RS + LDPC
- Turbo codes
- Raptor codes
- Polar codes
- Code-based cryptography

REED-SOLOMON CODES

- There is a faster decoding algorithm for RS (and BCH) codes, with running time $O(n \log n)$, discovered by Berlekamp and Massey in 1969.
- Berlekamp-Welch, discovered in 1986, is slower ($O(n^3)$), but can be adapted for L-list decoding of RS codes: Find all codewords c with $d(r, c) \leq L$. [Sudan 1996, Guruswami-Sudan 1998]
- RS codes are optimal erasure codes, so good for storage.
- Hardware architectures for encoding and decoding.

APPLICATIONS OF REED-SOLOMON CODES

- Communications
- Storage (CDs, DVDs, Blu-Ray, QR codes,....)
- Distributed storage
- Compressed sensing (signal processing)
- Group testing
- Learning theory
- Pseudorandomness
- Complexity theory
- Algorithm design

⋮

} newer
applications

"ESSENTIAL CODING THEORY" by Guruswami, Rudra and Sudan.