Huffman Codes

coding \rightarrow\text{compression}

- data on media e.g. CD, ...

- send data thru internet

raw data $\xrightarrow{\text{Alg.}}$ text

\[
\text{Encoding} \quad \xrightarrow{\text{run time}} \quad \text{coded data} \quad \xrightarrow{\text{Alg.}} \quad \text{Decoding}
\]

- lossless - data in = data out
- lossy - data in \neq data out
English

E, T, A, S, I, O, ...
a 0
b 1
c 00
d 01

0 000000000
- Chars are at leaves
- Path guys code

Prefix free codes = binary trees w/ leaves labelled by S

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Huffman coding is the optimal code (best compression) among codes that encode each character as an integral # of bits.