11-711 Recitation

Nikita Srivatsan

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CELEBRITY

7 Neat Tricks for Improving Memory Usage and Computation Speed

NUMBER 3 WILL CHANGE YOUR ASYMPTOTIC COMPLEXITY!!!

Posted on September 14, 2017, at 3:53 p.m.

Data Types

Max trigram count **468,261***

Max bigram count **7,109,704***

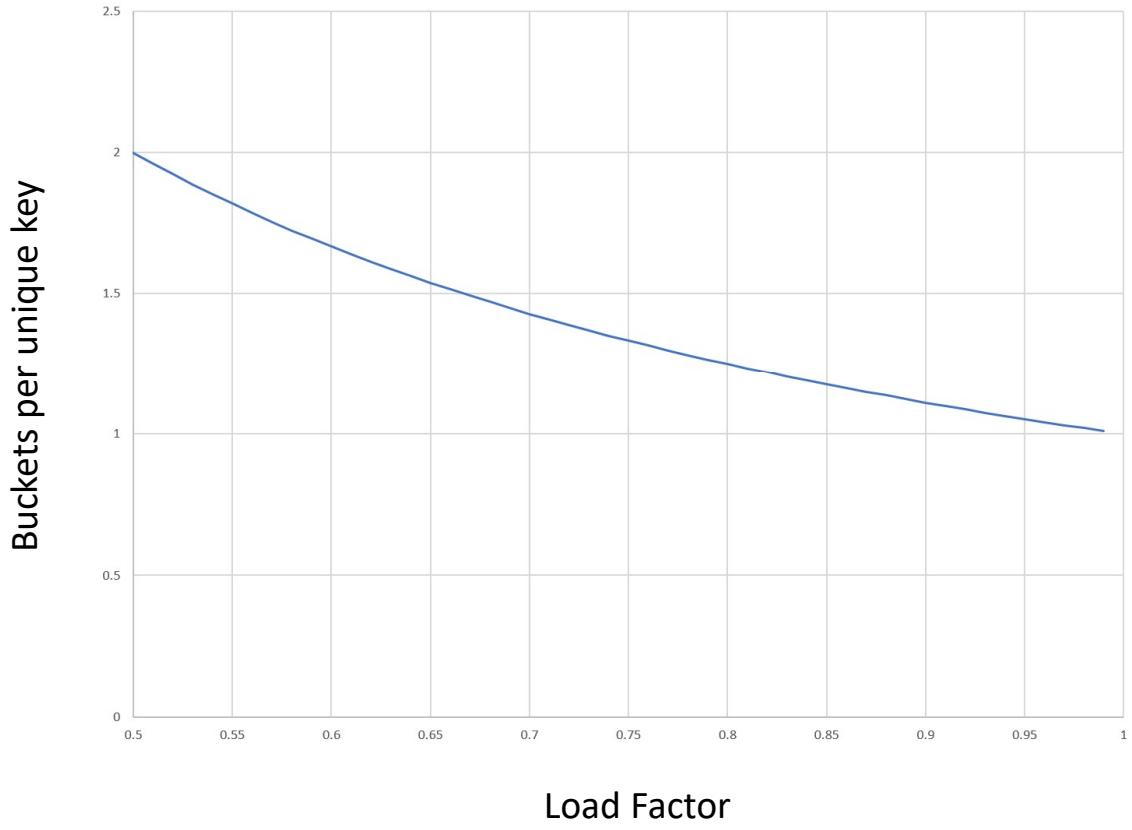
Max unigram count **19,880,264**

N_{1+} counts? **<=495,172**

MAX_INT **2,147,483,647**

MAX_SHORT **32,767**

Load Factor - Memory



Load Factor - Speed

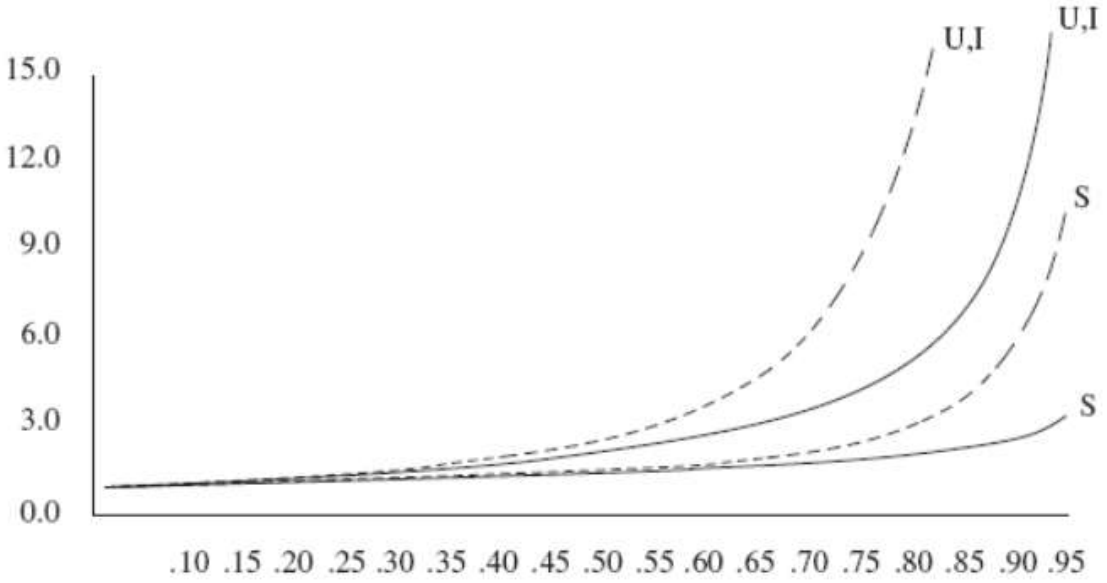


Figure 5.12 Number of probes plotted against load factor for linear probing (dashed) and random strategy (*S* is successful search, *U* is unsuccessful search, and *I* is insertion)

Image Credit: Chris Brown

Hash Functions

```
key = key ^ (key >> 32)
```

01101011

00000110

0110**1101**

Avoiding Loops

$$P(w_3|w_1w_2) = \frac{\max(c(w_1w_2w_3) - d, 0)}{\sum_{v \in V} c(w_1w_2v)} + \alpha(w_1w_2)P(w_3|w_2) = \\ = \frac{\max(c(w_1w_2w_3) - d, 0)}{c(w_1w_2)} + \alpha(w_1w_2)P(w_3|w_2) \quad (5)$$

$$\alpha(w_1w_2) = d \cdot \frac{N_{1+}(w_1w_2\bullet)}{c(w_1w_2)} \quad (10)$$

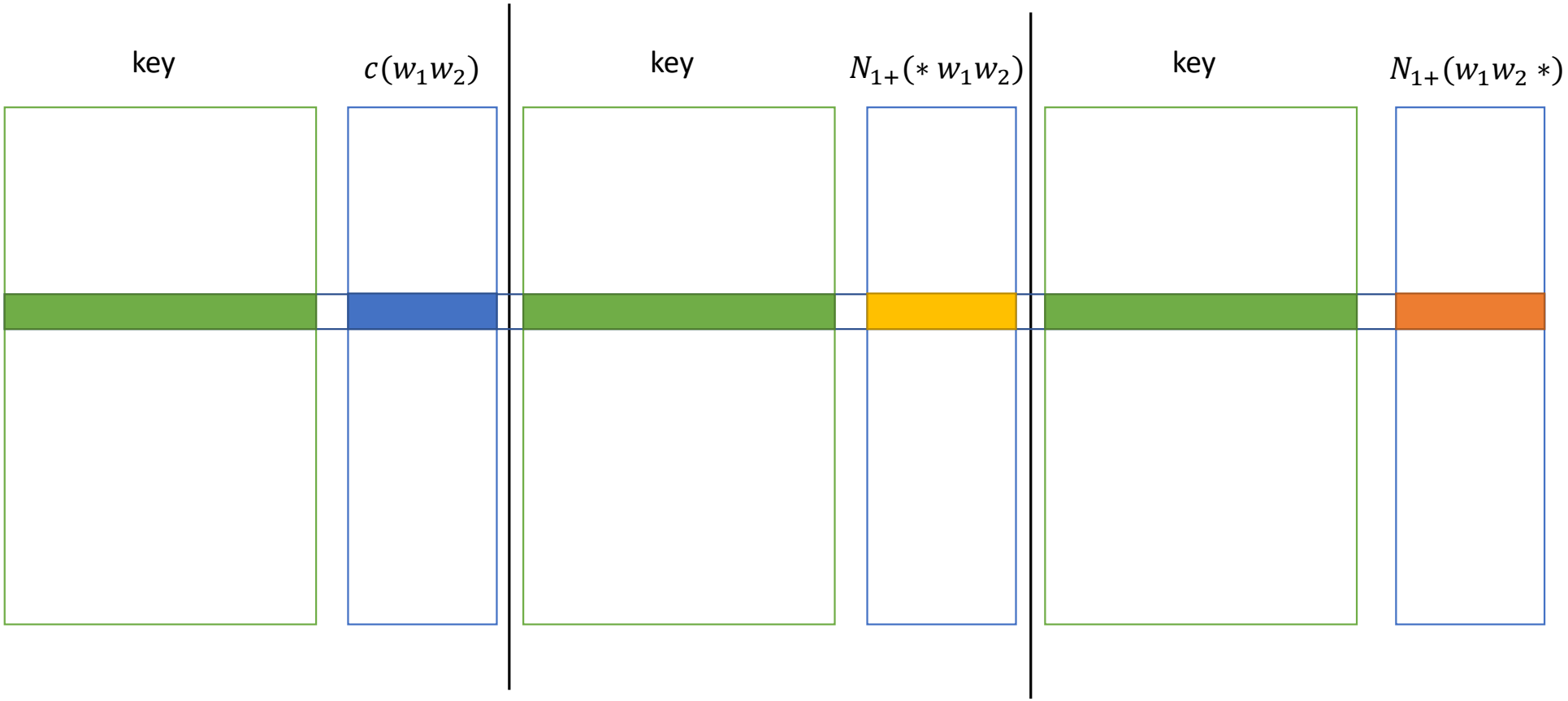
$$P(w_3|w_2) = \frac{\max(N_{1+}(\bullet w_2w_3) - d, 0)}{\sum_{v \in V} N_{1+}(\bullet w_2v)} + \alpha(w_2)P(w_3) = \\ = \frac{\max(N_{1+}(\bullet w_2w_3) - d, 0)}{N_{1+}(\bullet w_2\bullet)} + \alpha(w_2)P(w_3) \quad (6)$$

$$\alpha(w_2) = d \cdot \frac{N_{1+}(w_2\bullet)}{N_{1+}(\bullet w_2\bullet)} \quad (13)$$

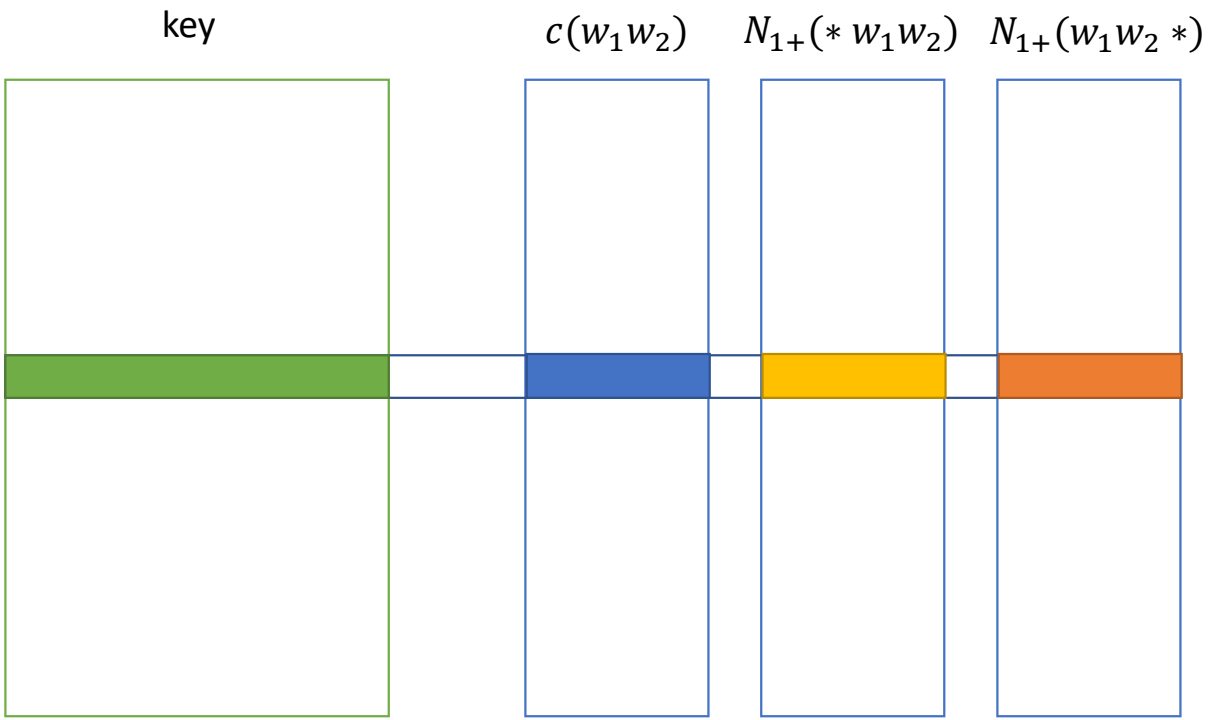
$$P(w_3) = \frac{N_{1+}(\bullet w_3)}{\sum_{v \in V} N_{1+}(\bullet v)} = \frac{N_{1+}(\bullet w_3)}{N_{1+}(\bullet\bullet)} \quad (7)$$

Image Credit: Maria Ryskina

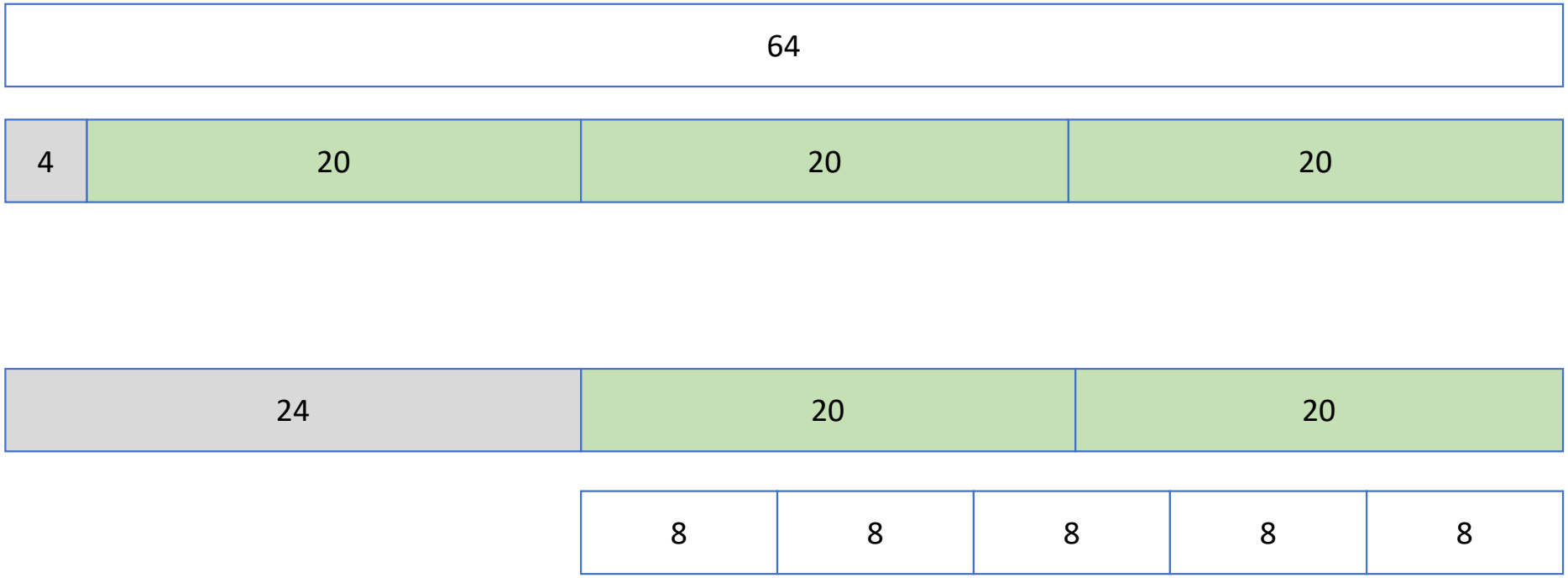
Multi-Value Hash Tables



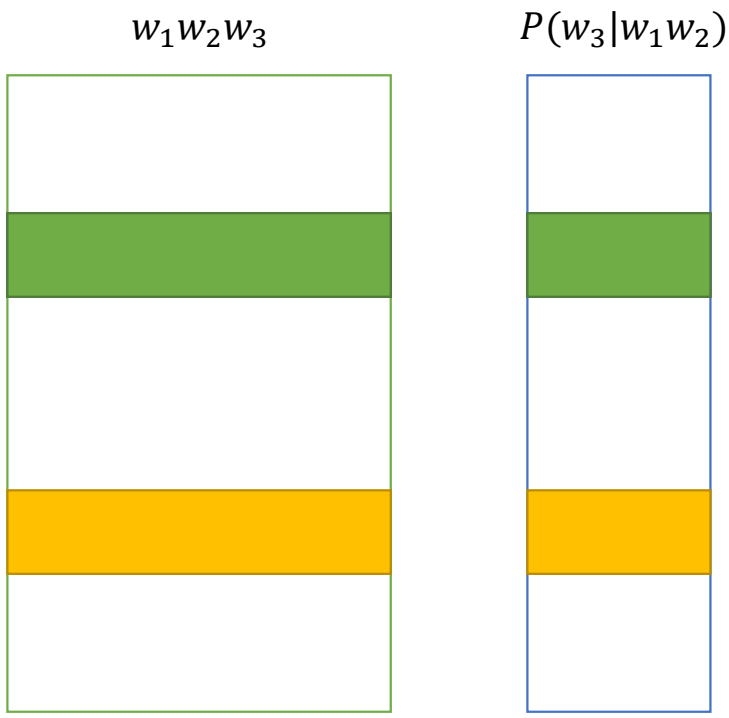
Multi-Value Hash Tables



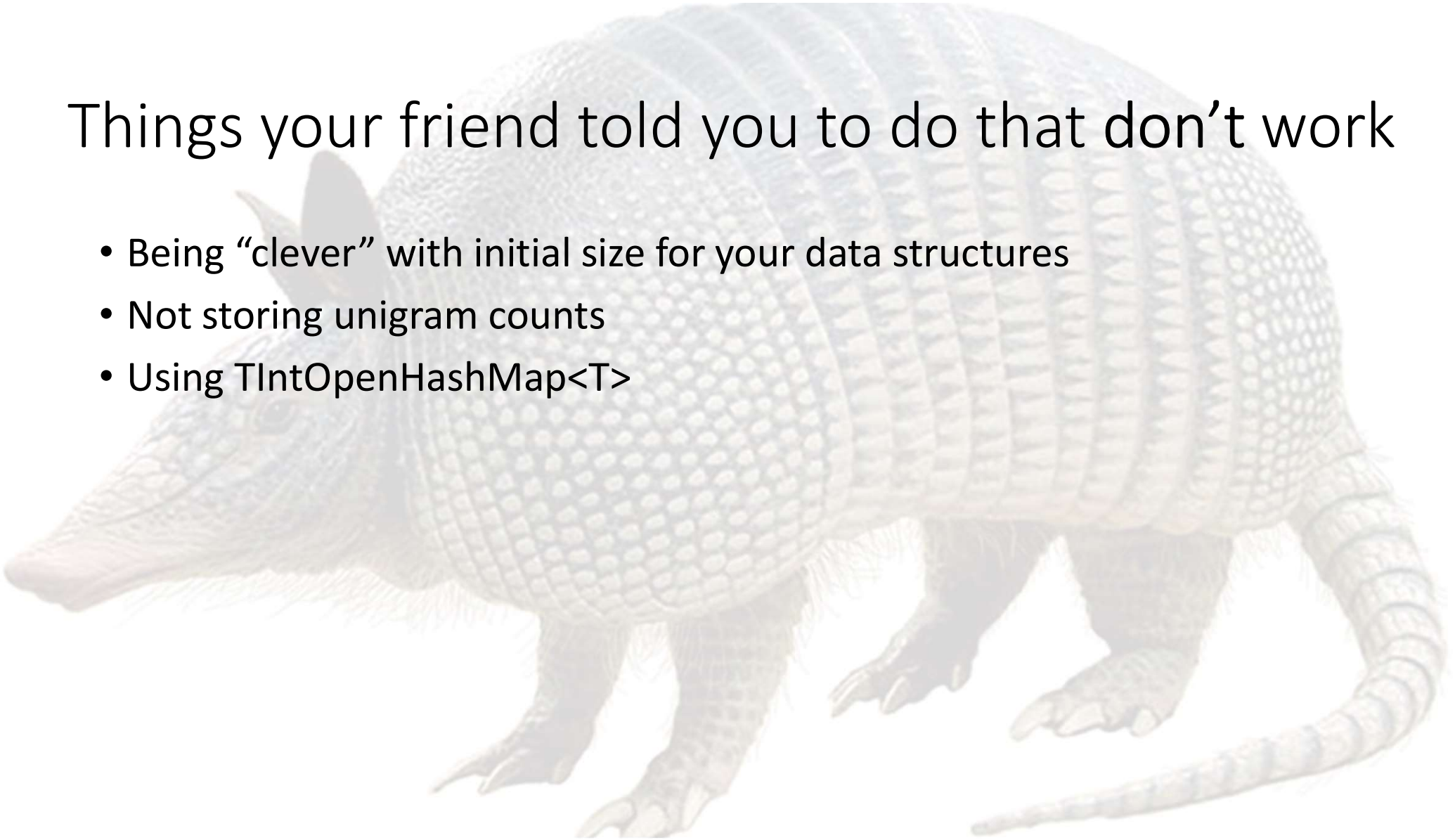
Byte Arrays (tentative)



Caching



Things your friend told you to do that don't work



- Being "clever" with initial size for your data structures
- Not storing unigram counts
- Using TIntOpenHashMap<T>

Questions?