

# Maths assessment for financial literacy programmes in newly industrialised countries: The power of a graph database

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# A case study

Many people in rural areas un-banked or partially banked and under-insured. High smartphone usage. Rollout of 4g and 5g is comprehensive.

Aim: To provide financial literacy education to a dispersed population to allow people to make better informed decisions about business development



## Learner challenges:

- Wide variance in pre-requisite knowledge
- Wide variance in access to formal learning opportunities
- Different endpoints

## Solution

- Adaptive initial assessment and curriculum
- Super-curriculum that connects pre-requisite contextualised maths knowledge and skills to the main course of learning



## Technical challenges:

- Mobile first, data light, 3/4g – balancing high latency and poor bandwidth but offering a compelling UX
- Client base requires low user cost and high completion rate - ROI

## Solution

- Off the shelf solutions rather than built from the ground up
- Learning is a fuzzy process – graph databases manage fuzzy better than relational databases

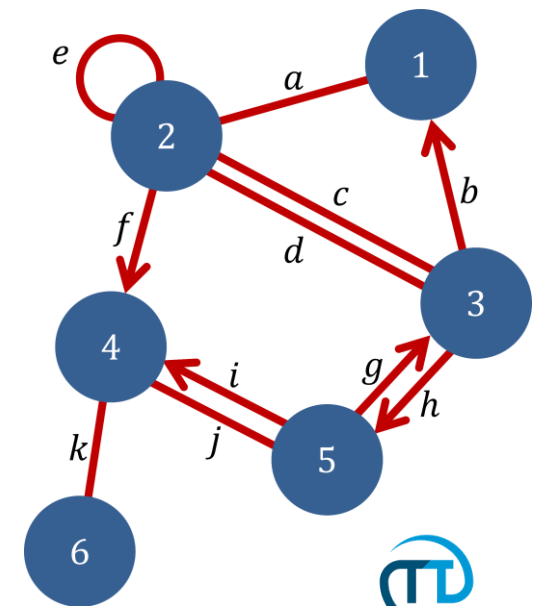
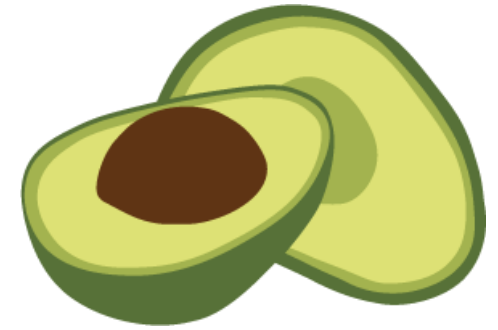


# The graph database

Parts of a curriculum are seen as a node.

The relationships between nodes for learners are managed by weighted edges.

Adaptivity becomes a graph traversal problem.

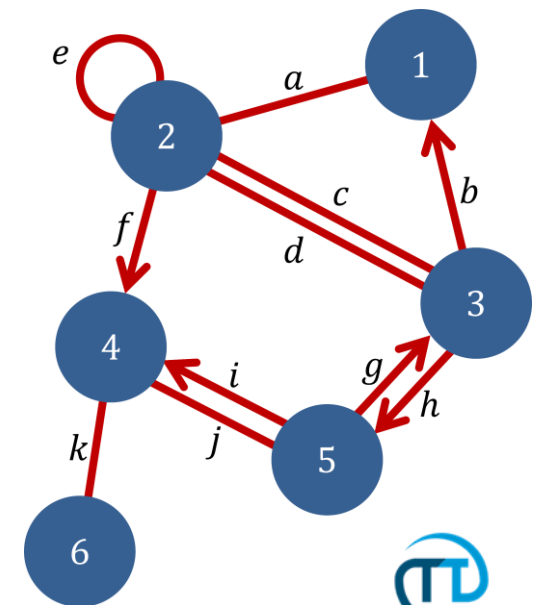
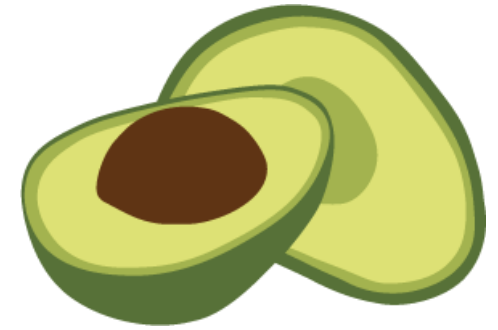


# The graph database

We have chosen ArangoDB as nodes and edges are managed as JSON documents.

This makes life a bit easier for developers as the dialogue with the CMS is straightforward.

The initial assessment is then managed as Markov Chain Monte Carlo.



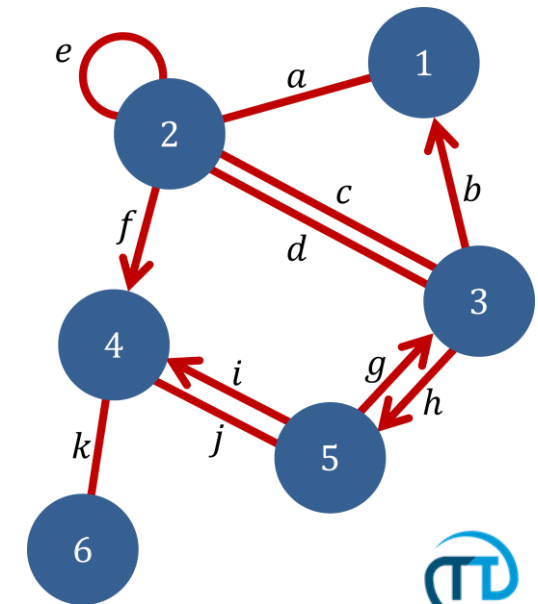
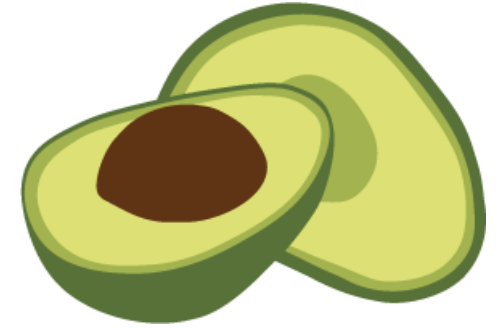
# The graph database – advantages

Quick and economical run-up

Straightforward link between front-end,  
database and then into ML tools –  
ArangoDB and Tensorflow

Global rollout

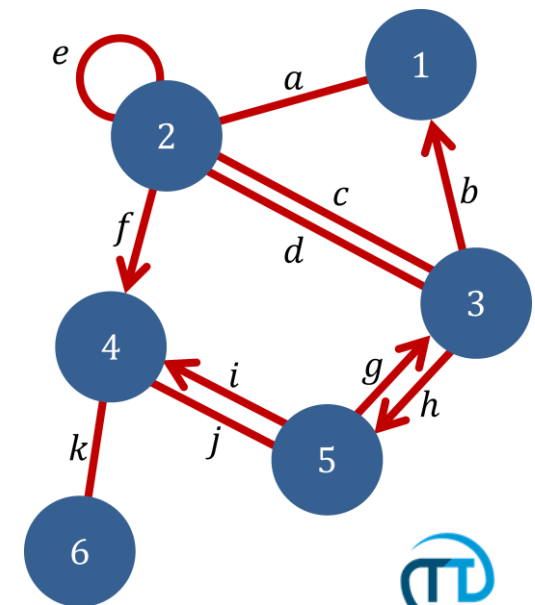
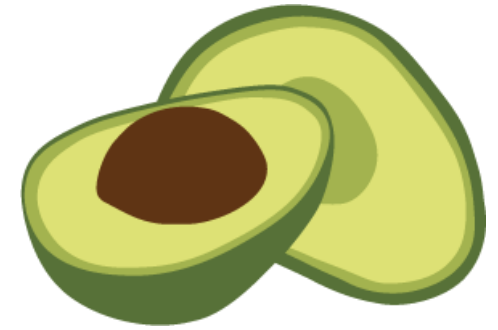
Playing with fuzzy logic, Bayes and Graph  
Theory



# The graph database – disadvantages

Off the shelf but we can find no use cases in learning delivery – feels a bit lonely

Off the shelf so had to spend some time refocusing typical Customer/Logistics use cases





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