Developing a teaching approach for GA that combine practical and theoretical aspects.
Can programming assist in understanding Mathematical based courses ?
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Motivation
One of the benefits of Graduate Apprenticeship is the use of work-based learning approach (Boud, D., et.al., 2001), that ensures reflecting on practical applications in the business environment impulsively (Taylor-Smith, E., et.al.(2019)).

Challenge
Teaching core courses
- Heavily centred around theory and concepts (K1, K3)
- Apprentice's diversity (A4,V1) in professional background, skills, qualifications and experience (Smith.S, et.al.(2020))

Zone of proximal Development (V. K. Zaretskii (2009), Vinney, Cynthia. (2021))
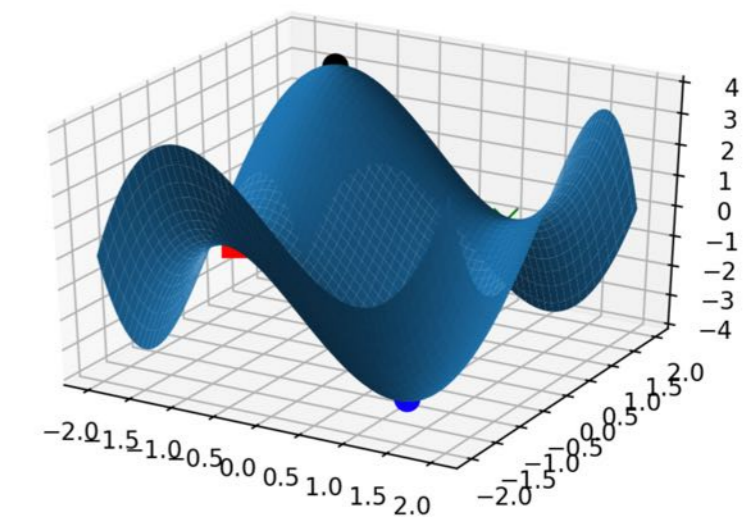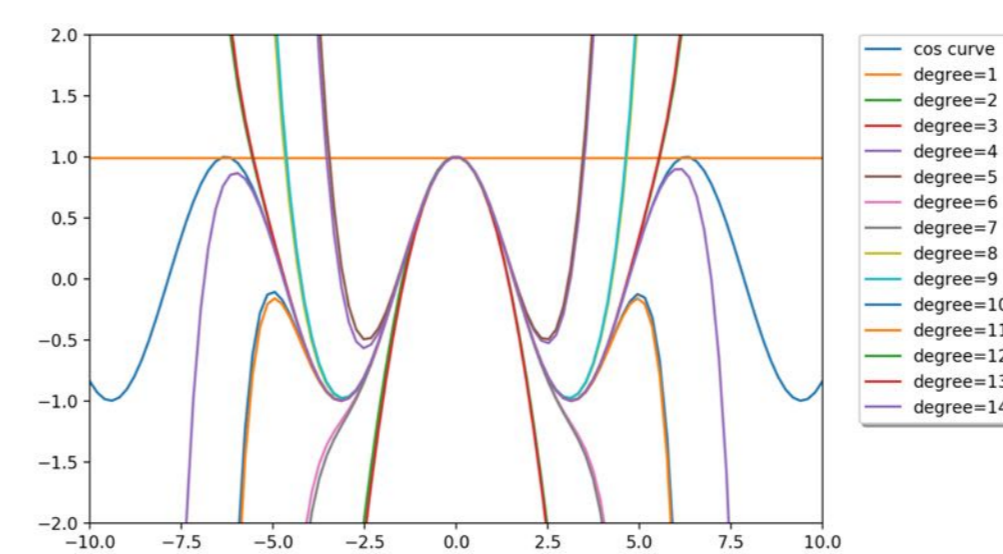
Scaffolding
(Fernández, M., et.al. (2001), Kurt,Serhat. (2020))

Approach
Using different software programming such as Matlab, Python etc. to teach (A4,K4,V2) mathematical core courses
(Abdulwahed, M., et.al. (2012), Bergin, S., et.al.(2005), Juan, A.A., et.al (2011))

- Solving the mathematical problem analytically and numerically
- Reflecting on the similarities and differences between analytic and numerical solutions
- Plotting the functions for better understanding and visualisation

Conclusion
Factors affecting approach's success
Course / Programme context
Student diversity
Student inclusivity (A4, K2, V2)

Outcomes
- Offers an interactive environment to explore programming based procedural and functional approaches to problem-solving (A4, K3)
- Assures the apprentices are confident with their results (K4,V2)
- Assists the apprentices in visualising the mathematical concepts (Sithole, A., et.al.(2017))

Future work
- Evaluate (A5,V3) this approach from the apprentices' point of view
- Proposing this approach to GAs in all years and non GA programmes (K6, V4).

Benefits
- Enhance our apprentices computational skills
- Improve their understandings of pure mathematical theories
- Introduce new applications in their work-based area.
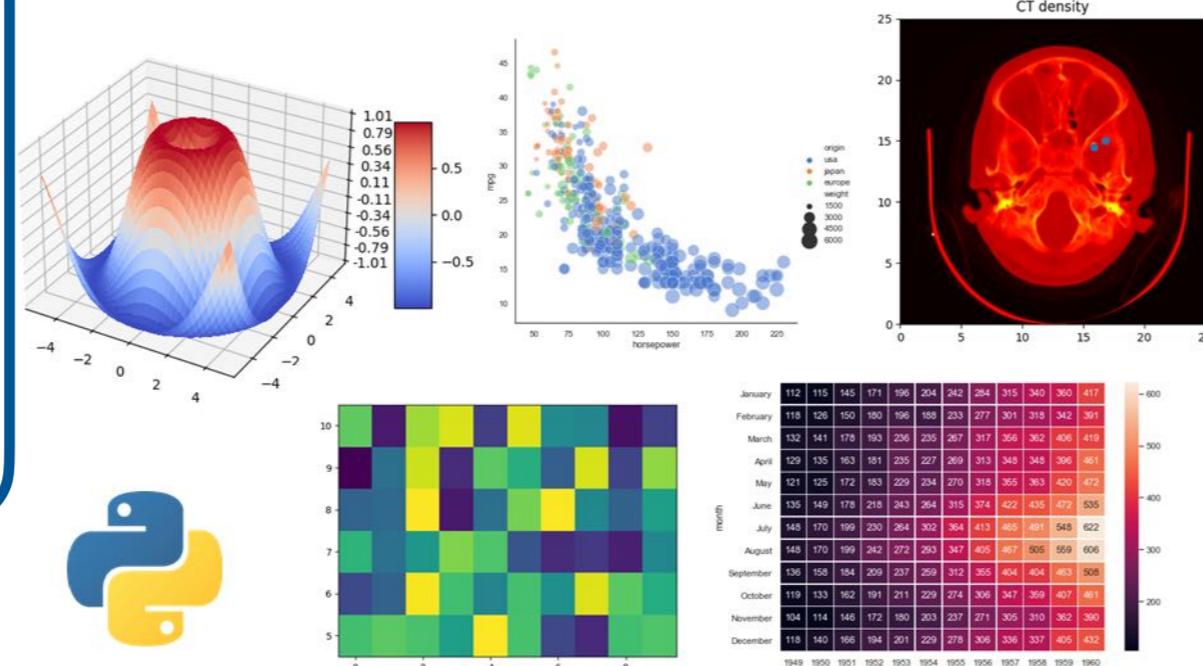
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