

PROBLEM-BASED LEARNING

A PRESENTATION TO THE REFLECTIVE TEACHING COMMUNITY

BY JOHN ALESHUNAS

EXPERIENCE IS THAT MARVELOUS THING THAT
ENABLES YOU TO RECOGNIZE A MISTAKE WHEN
YOU MAKE IT AGAIN. - FRANKLIN P. JONES

OUTLINE

- CONCEPTS AND RATIONALE FOR PROBLEM-BASED LEARNING
- AN EXAMPLE ASSIGNMENT
- SOME BACKGROUND INFORMATION
- STUDENT ASSESSMENT
- DISCUSSION

CONCEPTS AND RATIONALE FOR PROBLEM-BASED LEARNING

- RESILIENCE WHEN FACED WITH FAILURE IS A REQUIREMENT IN STEM DISCIPLINES [...AND MOST EVERYWHERE ELSE]
- FOCUS ON THE PROCESS, NOT THE CONCLUSION
- IF YOU ARE NOT FAILING, YOU ARE NOT DOING IT CORRECTLY

CONCEPTS AND RATIONALE FOR PROBLEM-BASED LEARNING

- EXPERIENTIAL LEARNING CAN PROVIDE DIVERSE RESULTS
- UNFORGETTABLE, DEVELOP CONFIDENCE
- SOME PEOPLE LEARN BY READING, SOME PEOPLE LEARN BY WATCHING, AND THE REST HAVE TO PEE ON THE ELECTRIC FENCE FOR THEMSELVES. — WILL ROGERS

CONCEPTS AND RATIONALE FOR PROBLEM-BASED LEARNING

- POORLY SPECIFIED GOALS OR OUTCOMES
- RESEARCH-BASED ASSIGNMENTS
- I WE KNEW WHAT WE WERE DOING, WE WOULDN'T BE ABLE TO CALL IT RESEARCH. – ALBERT EINSTEIN
- RESEARCH IS WHAT I'M DOING WHEN I DON'T KNOW WHAT I'M DOING. - WERNHER VON BRAUN

AN EXAMPLE ASSIGNMENT

SCENARIO: THIS EXERCISE REQUIRES YOU TO USE THE R K-MEANS ALGORITHM IMPLEMENTATION TO DISCOVER THE NATURAL CLUSTERS IN A DATASET. YOU WILL USE THE DATASET **UNKNOWN_CLUSTERS.CSV** FOR THIS EXERCISE. ONCE YOU HAVE DETERMINED THE NUMBER OF CLUSTERS IN THE DATASET, YOU MUST PROVIDE ANALYTICAL RESULTS THAT SUPPORT YOUR ASSERTION. YOUR ANALYSIS OF THIS PROBLEM IS THE POINT OF THIS EXERCISE.

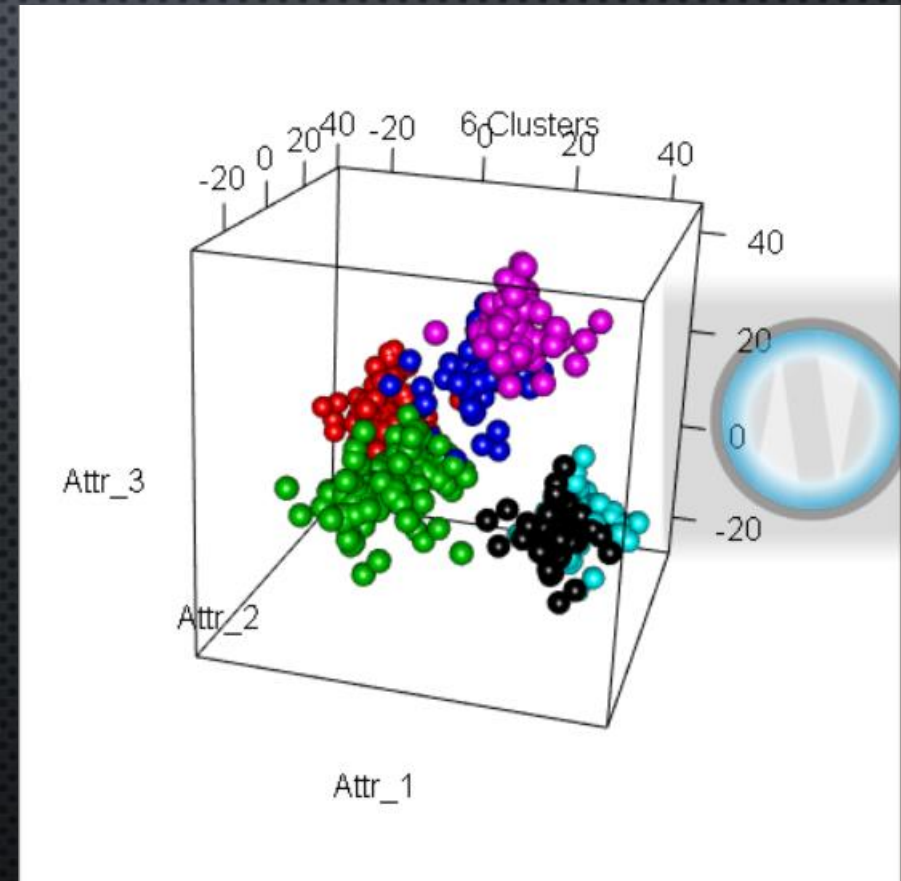
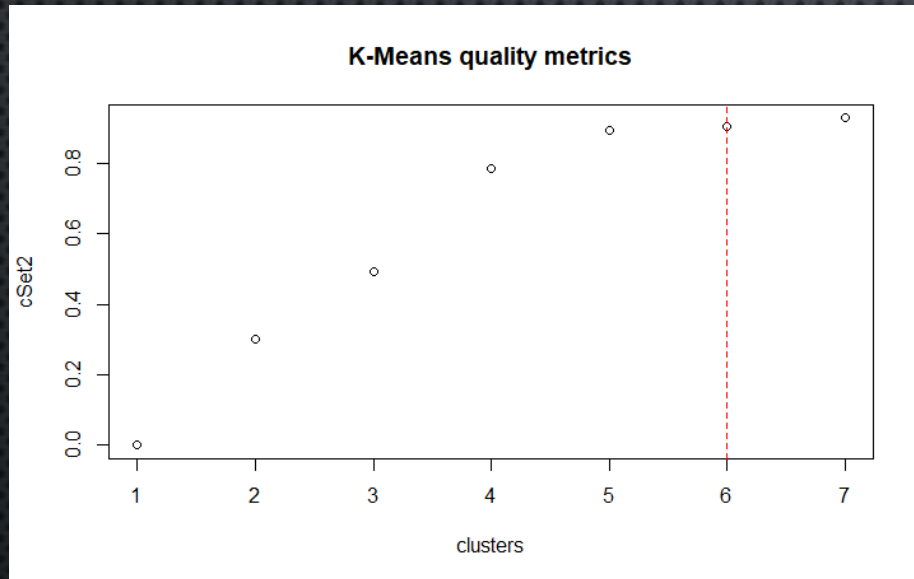
YOU MUST DESIGN YOUR OWN EXPERIMENT THAT WILL:

- DISCOVER HOW MANY CLUSTERS ARE IN THE PROVIDED DATASET
- CONDUCT ANALYSIS OF YOUR CLUSTERS TO VERIFY THAT THEY ARE AN OPTIMAL SET OF CLUSTERS
- VALIDATE YOUR CLUSTER COUNT WITH APPROPRIATE ANALYTICAL RESULTS

I WENT INTO A GENERAL STORE, AND THEY WOULDN'T SELL ME ANYTHING SPECIFIC - STEVEN WRIGHT

SOME BACKGROUND INFORMATION

- K-MEANS



SOME BACKGROUND INFORMATION

A CLUSTERING DEMONSTRATION

WHO ARE YOU GOING TO BELIEVE, ME OR YOUR LYING EYES? – GROUCHO MARX

STUDENT ASSESSMENT

- DESCRIBE YOUR EXPERIENCES WORKING THROUGH THE ASSIGNMENT
- WHAT DID YOU LEARN FROM THIS ASSIGNMENT?

SUMMARY

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- **DISCUSSION**

