Career Recommendation System for 10th Grade Students

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Objective

- To develop a personalized career recommendation system for 10th-grade students.
- The system considers:
  - Academic performance in subjects like: Physics, Chemistry, Mathematics, Biology, English, Social Science.
  - Personality traits and personal interests.
- Recommendations include:
  - Career options.
  - +2 stream.
  - Degree programs.

- Gather data on:
  - **Academic performance**: Collect subject-wise scores in:
    - Physics, Chemistry, Mathematics, Biology, English, and Social Science.
    - Focus on identifying strengths in specific subjects.
  - **Personality traits**: Use psychometric tests like:
    - The Big Five personality test (measures openness, conscientiousness, etc.).
    - Holland Codes (RIASEC model for career-oriented traits).
  - **Personal interests**: Design surveys or questionnaires to identify:
    - Hobbies and extracurricular activities (e.g., coding, writing, sports).

Content-Based Filtering for Career Recommendation

- Content-based filtering recommends careers to students based on the features of both students and careers.
- **How It Works:**
  - Career profiles are created by defining the features such as:
    - Academic requirements (subject marks).
    - Personality traits (e.g., openness, conscientiousness).
    - Personal interests (e.g., hobbies, career aspirations).
  - Student profiles are collected based on:
    - Marks in various subjects.
    - Personality traits (from psychometric tests).
    - Interests (from surveys or questionnaires).
  - The system calculates the similarity between student profiles and career profiles using similarity metrics.

Steps in Content-Based Filtering

- **Step 1: Create Career Profiles:**
  - Define career features based on subject requirements, personality traits, and interests.
  - Example: Software Engineer career profile.
- **Step 2: Collect Student Data:**
  - Collect marks in subjects like Physics, Maths, Chemistry, Biology.
  - Collect personality traits and interests.
- **Step 3: Similarity Calculation:**
  - Calculate the similarity between the student's profile and each career profile.
  - Use similarity metrics such as cosine similarity or Euclidean distance.
- **Step 4: Recommend Top Careers:**
  - Rank careers based on similarity scores.
  - Recommend the top careers to the student.

- **Career Profile: Software Engineer**
  - **Subject Requirements:** High scores in Maths.
  - **Personality Traits:** High analytical thinking, problem-solving skills, and conscientiousness.
  - **Interests:** Coding, software development, AI, and technology.
- **Student Profile Example:**
  - **Marks:** Maths = 85, Physics = 80, Chemistry = 70.
  - **Personality Traits:** Analytical, problem-solving, detail-oriented.
  - **Interests:** Interest in programming and technology.

Similarity Calculation

- The system computes the similarity between the student's profile and the career profile using cosine similarity.
- **Cosine Similarity Formula:**

$$\text{Similarity} = \frac{\vec{A} \cdot \vec{B}}{|\vec{A}| \cdot |\vec{B}|}$$

  Where $\vec{A}$ and $\vec{B}$ are the student and career feature vectors, respectively.
- **Example:**
    - Student Profile: [85, 80, 70, 0.8, 0.7, 0.6] (marks + personality traits).
    - Career Profile: [80, 75, 60, 0.9, 0.8, 0.7] (subject requirements + personality traits).

- The system computes similarity scores for all career profiles and ranks them.
- The top careers are recommended to the student.
- **Example Output:**
  1. **Software Engineer:** Similarity score $= 0.85$.
  2. **Data Scientist:** Similarity score $= 0.80$.
  3. **Mechanical Engineer:** Similarity score $= 0.75$.
- The career with the highest similarity is recommended as the top career.

- Guide students on the educational path required to achieve their chosen career.
- **Components of the Pathway:**
  - **+2 Stream:**
  - Suggest the ideal stream for Grade 12 based on the chosen career.
  - Examples:
    - **Software Engineer:** Science Stream with Maths and Computer Science.
    - **Doctor:** Science Stream with Biology, Chemistry, and Physics.

Career Path Recommendation (Part 2)

- **Undergraduate Degree:** Recommend degree programs based on the chosen career. Examples:
  - **Software Engineer:** B.Tech in Computer Science or IT.
  - **Doctor:** MBBS, followed by specialization.
- **Additional Requirements:** Highlight any entrance exams or certifications. Examples:
  - **Software Engineer:** Coding bootcamps, internships at tech companies.
  - **Doctor:** NEET exam for medical college admission.
- **Output: Career Path:** Example for Software Engineer:
  1. +2 Stream: Science with Maths and Computer Science.
  2. Degree: B.Tech in Computer Science or IT.
  3. Additional: Competitive programming, internships, certifications.

Thank You!