

Jumlah True Positive = 8, jumlah False Negative = 0, Recall = 8/8 atau **Recall = 1**.

4. F1 Score

F1 Score adalah harmonic mean dari precision dan recall.

$$\text{F1 Score} = 2 \times \frac{\text{Precision} \times \text{Recall}}{\text{Precision} + \text{Recall}}$$

Precision = 0.5, Recall = 1, **F1 Score = 0.67**

5. Mean Reciprocal Rank (MRR)

Dari tabel nilai hasil sistem, bisa kita hitung MRR dengan menjumlahkan kolom *Reciprocal Rank* dan dibagi dengan banyaknya nilai.

$$\text{MRR} = \frac{1}{|Q|} \sum_{i=1}^{|Q|} \frac{1}{\text{rank}_i}$$

Hasil yang didapatkan **MRR = 0.2112955621**.

4.2 Analisis Hasil Pengujian

Berdasarkan hasil pengujian kebenaran sistem, maka dapat dilakukan analisis sebagai berikut:

1. Berdasarkan dataset yang sudah didapat bisa kita hitung persentase jumlah triple dengan jumlah kalimat, dataset memiliki 610 *nodes*, dengan 10 *nodes* subjek, dan 600 *nodes* objek. Pada dataset tersebut terdapat triple sebanyak 1,119 triple. Dengan menggunakan script Python, kita bisa mendapatkan jumlah fakta yang dipakai untuk mendapatkan triple yaitu sebanyak 4,334 fakta. Persentase yang didapat sebesar 25.82%. Bisa disimpulkan bahwa masih banyak triple yang belum berhasil diekstraksi oleh sistem, karena masih ada 74.18% fakta yang terdapat pada halaman web Nasa yang belum bisa digunakan untuk penelitian ini.
2. Berdasarkan hasil pengujian sistem, bisa didapatkan Akurasi = 0.78, Precision = 0.5, Recall = 1, F1 Score = 0.67, dan MRR = 0.2112955621.

5. Kesimpulan

Hasil dari penelitian ini masih banyak yang perlu ditingkatkan, terutama di bagian ekstraksi *triple* yang masih banyak membutuhkan pengembangan, dimana *triple* yang didapat hanya berdasarkan *pos tag* dari NLTK dan *pattern recognition* sederhana, belum menggunakan learning untuk menyesuaikan konteks.

Fitur dari *Question Answering System* hanya mampu mendukung 2 jenis pertanyaan. Pertama pertanyaan deskriptif sederhana, seperti “What is Sun?” atau “What is Earth”, dan pertanyaan-pertanyaan sejenis, dimana pada pertanyaan tersebut akan dicari objek dari subjek “Sun” dengan predikat “is”. Kedua adalah pertanyaan yang mengandung objek dan predikat, seperti “What planet orbits the Sun?”, pada pertanyaan tersebut akan dicari subjek-subjek yang memiliki predikat “orbit” dan objek “Sun”.

Kekurangan dari penelitian ini diharapkan dapat ditingkatkan dan diselesaikan pada penelitian selanjutnya. Penelitian selanjutnya diharapkan bisa meningkatkan keakuratan fakta dari *Knowledge Graph* mengenai solar system dan juga menambah fitur pertanyaan yang bisa dijawab oleh *Question Answering System*.

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