

What should Entity Linking link? [†]

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[†] AMW - Alberto Mendelzon Workshop.

Example

Joseph Walter “Joe” Jackson, was a steelworker at U.S. Steel. In an interview with Martin Bashir for the 2003 documentary *Living with Michael Jackson*, Jackson recalled that Joe often sat in a chair with a belt in his hand as he and his siblings rehearsed.

Example - Entity Recognition

Joseph Walter “Joe” Jackson, was a steelworker at U.S. Steel. In an interview with Martin Bashir for the 2003 documentary Living with Michael Jackson, Jackson recalled that Joe often sat in a chair with a belt in his hand as he and his siblings rehearsed.

Example - Entity Disambiguation

Wikipedia, the free encyclopedia

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Martin Bashir

From Wikipedia, the free encyclopedia

For the former MSNBC show, see **Martin Bashir (TV series)**.

Martin Henry Bashir (born 19 January 1960) is a British journalist.

After initially gaining prominence on British television with his BBC interview with Diana, Princess of Wales, and then his controversial fly-on-the-wall documentary with pop singer Michael Jackson on TV. Bashir was a political commentator for MSNBC, hosting *Martin Bashir TV* until its cancellation.

Martin Bashir

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Joe Jackson (manager)

From Wikipedia, the free encyclopedia

Joseph Walter Jackson (born July 26, 1930) is an American talent manager, and the patriarch of the Jackson family of entertainers which includes the pop icons Michael Jackson and Janet Jackson.

Joe Jackson

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U.S. Steel

From Wikipedia, the free encyclopedia
(redirected from **US Steel**)

The **United States Steel Corporation** (NYSE: **X**), more commonly known as **U.S. Steel**, is an American integrated steel producer headquartered in Pittsburgh, Pennsylvania, with production operations in the United States, Canada, and Central Europe. As of 2010, the company was the world's 24th largest steel producer and second largest domestic.

United States Steel Corporation

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Type
Traded as
Industry

Public
NYSE: **X**
ISIN: **US35402C1008**

Joseph Walter “Joe” Jackson, was a steelworker at U.S. Steel. In an interview with Martin Bashir for the 2003 documentary Living with Michael Jackson, Jackson recalled that Joe often sat in a chair with a belt in his hand as he and his siblings rehearsed.

Wikipedia, the free encyclopedia

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Michael Jackson

From Wikipedia, the free encyclopedia

*For other people named Michael Jackson, see Michael Jackson (disambiguation).
“King of Pop” redirects here. For other uses, see King of Pop (disambiguation).*

Michael Joseph Jackson (August 26, 1958 – June 25, 2009) was an American singer, songwriter, and dancer. Dubbed the “King of Pop”, he was one of the most popular entertainers in the world, and was the best-selling music artist during the year of his death (1992). Jackson's contributions to music, dance, and theater (MTV) along with his publicized personal life made him a global figure in popular culture for over four decades.

The eighth child of the Jackson family, Michael made his professional debut in 1971 with his solo track “Ben”. This, “Ben”, and “Wanna Be Startin' Someth'” are a member of the Jackson 5. He began his solo career in 1972 with “Motown Moments”. In the early 1980s, Jackson became a dominant figure in popular music. His music videos,

Michael Jackson

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Wikipedia, the free encyclopedia

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Living with Michael Jackson

From Wikipedia, the free encyclopedia

Living with Michael Jackson is a television documentary in which Martin Bashir interviewed Michael Jackson over a span of 6 months, from May 2002 to January 2003, about different aspects of his life. It was shown first in the United Kingdom on ITV (as a bought special) on February 3, 2003, and in the United States 3 days later on ABC, introduced by Bashir.

Living with Michael Jackson

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Genre
Documentary

Name Variations in Entity Linking

Michael Joseph Jackson

Michael J. Jackson

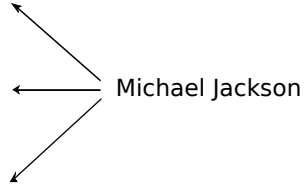
King of Pop



Name Variations in Entity Linking

The image displays three screenshots of Wikipedia pages, each showing a different disambiguation or article structure for the name "Michael Jackson".

- Top Screenshot: Michael Jackson (singer)**
 - Article title: Michael Jackson
 - Subtitle: From Wikipedia, the free encyclopedia
 - Text: "For other people named Michael Jackson, see Michael Jackson (disambiguation)." and "For other people named Michael Jackson, see Michael Jackson (disambiguation)." (Note: The text in the image is slightly repetitive/typoed).
 - Text: "King of Pop" redirects here. For other uses, see King of Pop (disambiguation).
 - Text: Michael Joseph Jackson (August 29, 1958 – June 25, 2009) was an American singer, songwriter, and dancer.
 - Image: A small portrait of Michael Jackson.
- Middle Screenshot: Michael Jackson (writer)**
 - Article title: Michael Jackson (writer)
 - Subtitle: From Wikipedia, the free encyclopedia
 - Text: "For other people named Michael Jackson, see Michael Jackson (disambiguation)." (Note: The text in the image is slightly repetitive/typoed).
 - Text: Michael James Jackson (27 March 1942 – 30 August 2007) was an English writer and journalist. He was the author of many influential books about race and ethnicity. He was a regular contributor to a number of British newspapers, particularly The Independent and The Observer.^[1]
 - Text: Jackson's books have sold over three million copies worldwide and have been translated into eighteen different languages.^[2] He is credited with helping to start a renaissance of interest in race and increasing worldwide in the 1970s, particularly in the United States.^[3] He is also widely credited with popularising the idea of race codes.^[4] His influential television series The Blue Room was shown in fifteen different countries.^[5]
 - Text: He was as well-versed in racial identity as he was in sex, and his book Michael Jackson's Mail Whistle (1989) is the best-selling book on the subject in the world.^[6]
 - Text: At the time of his death Jackson had been suffering from Pseudotumor Cerebrum for at least a decade. He did not decline his illness until his symptoms caused some to think he was drunk.^[7]
 - Image: A portrait of Michael Jackson.
- Bottom Screenshot: Michael Jackson (actor)**
 - Article title: Michael Jackson (actor)
 - Subtitle: From Wikipedia, the free encyclopedia
 - Text: "For other people named Michael Jackson, see Michael Jackson (disambiguation)." (Note: The text in the image is slightly repetitive/typoed).
 - Text: This biography of a living person needs additional citations for verification. Please help by adding reliable sources. Contentious material about living persons that is unbalanced or poorly sourced must be removed immediately, especially if potentially libelous or harmful. (May 2016) (Learn how and when to remove this template message)
 - Text: Michael Jackson (born November 8, 1970) is a Canadian actor, grip, gaffer and for his acting role as "Tanner" in the comedy TV series Trailer Park Boys (2006–2017) and the later film Trailer Park Boys: The Movie (2006).^[1]
 - Text: Jackson was born in Ottawa, Ontario and grew up in ^[1] in Darmouth, Nova Scotia, where he currently lives.
 - Text: He has contributed to the local music scene^[1] with many group and solo projects, including Moral Support, Aimless, Thruster, The Thursday Trolls, Pink Kitten, Defense Andrew, The Sympsonics, Rock of The Skins, El Grupo De Rock, Visions, T-Bag, The Olympian and most recently Doug Mason. He is also an AHSJ 549 member and has been working as a grip since 1995.
 - Text: **Filmography** [edit]
 - Text: Actor - Film titles and associated role^[1]
 - Image: A portrait of Michael Jackson.



Example - Any other entity?

Wikipedia, the free encyclopedia

Article: **Martin Bashir**

For the former MSNBC show, see **Martin Bashir (TV series)**.

Martin Henry Bashir (born 19 January 1960) is a British journalist.

After initially gaining prominence on British television with his BBC interview with Diana, Princess of Wales, and then his controversial fly-on-the-wall documentary with pop singer Michael Jackson on TV, Bashir was a political commentator for MSNBC, hosting *Martin Bashir TV*, and a commentator



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Wikipedia, the free encyclopedia

Article: **Joe Jackson (manager)**

From Wikipedia, the free encyclopedia

Joseph Walter Jackson (born July 26, 1930) is an American talent manager, and the patriarch of the Jackson family of entertainers which includes the pop icons Michael Jackson and Janet Jackson.

Comments [show]

Early life and ancestry [edit]

Jackson was born to Samuel Jackson (1880–1957) an university professor, and Crystal Lee King (1900–1987) in Florence, MS, Arkansas, on July 26, 1930. Born in 1930, according to the Arkansas Black Hall of Fame and Culture Jackson's last fly family, The Jackson 1930s. Jackson was the oldest of five children, which included brother Laurence (died 2017) and father and sisters LaMar and Lorna Lee. Samuel was the son of Isaac Henry Jackson (1828–1907), a slave, noted near the town of York, Michigan.



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Wikipedia, the free encyclopedia

Article: **U.S. Steel**

From Wikipedia, the free encyclopedia (redirected from **USS Steel**)

The **United States Steel Corporation** (NYSE: **NYSE: X**), more commonly known as **U.S. Steel**, is an American integrated steel producer headquartered in Pittsburgh, Pennsylvania, with production operations in the United States, Canada, and Central Europe. As of 2010, the company was the world's 24th largest steel producer and second largest domestic



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Type: **Traded as:** **NYSE: X** **ISIT:** **402** **Component:** **Steel**

Joseph Walter “Joe” Jackson, was a steelworker at U.S. Steel. In an interview with Martin Bashir for the 2003 documentary Living with Michael Jackson, Jackson recalled that Joe often sat in a chair with a belt in his hand as he and his siblings rehearsed.

Wikipedia, the free encyclopedia

Article: **Michael Jackson**

From Wikipedia, the free encyclopedia

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Michael Joseph Jackson (August 26, 1958 – June 25, 2009) was an American singer, songwriter, and dancer. Dubbed the "King of Pop", he was one of the most popular entertainers in the world, and was the best-selling music artist during the year of his death (1997). Jackson's contributions to music, dance, and theater (1970) along with his publicized personal life made him a global figure in popular culture for over four decades.

The eighth child of the Jackson family, Michael made his professional debut in 1968 with his siblings Jermaine, Tito, Marlon, and LaToya as a member of the Jackson 5. He began his solo career in 1971 with *Michael's Banned*. In the early 1980s, Jackson became a dominant figure in popular music. His music videos,



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Wikipedia, the free encyclopedia

Article: **Living with Michael Jackson**

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Living with Michael Jackson is a television documentary in which Martin Bashir interviewed Michael Jackson over a span of 10 months, from May 2002 to January 2003, about different aspects of his life. It was shown first in the United Kingdom on ITV (as a bought special) on February 3, 2003, and in the United States 3 days later on ABC, introduced by Bashir.



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Martin Bashir

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United States Steel Corporation



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The eighth child of the Jackson family, Michael made his professional debut in 1971 with his solo track “Ben”. This, “Ben”, and “Wanna Be Startin' Now” were the first three solo singles to chart on the *Billboard* Hot 100. In 1979, Jackson released his debut album, *Off the Wall*, which was a commercial success. In 1982, he released his second album, *Thriller*, which is often cited as the first “concept album” in popular music. His music videos, such as “Thriller”, “Scream”, and “Billie Jean”, were groundbreaking.



Michael Jackson

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The eighth child of the Jackson family, Michael made his professional debut in 1971 with his solo track "Ben". This, "Ben", and "Rock with You" are members of the Jackson 5. He began his solo career in 1972 with "Meat & Potatoes". In the mid-1980s, Jackson became a dominant figure in popular music. His music videos,



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Michael Jackson



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Living with Michael Jackson



- What should Entity Linking link?

- *What is an 'entity'?*

Class-based definition

person



location



organization



temporal expressions



quantities



Class-based definition



?

person



location



organization



temporal expressions



quantities



Knowledge Base definition

The image displays four overlapping screenshots of Wikipedia pages, illustrating the structure and content of a knowledge base. The pages shown are:

- Michael Jackson**: The article title is "Michael Jackson". The subtitle is "From Wikipedia, the free encyclopedia". The text below the title says "For other people named Michael Jackson, see Michael Jackson (disambiguation)".
- 2003**: The article title is "2003". The subtitle is "From Wikipedia, the free encyclopedia". The text below the title says "This article is about the year 2003." and "2003 (MMLIII) was a common year starting on Wednesday of the Gregorian calendar, the 2003rd year of the Common Era (CE) and of the 21st century.".
- Chair**: The article title is "Chair". The subtitle is "From Wikipedia, the free encyclopedia". The text below the title says "This article is about furniture. For other uses, see Chair (disambiguation)." and "A chair is a piece of furniture with a raised surface supported by legs, commonly used to seat a single person. Chairs are supported..."
- Belt (clothing)**: The article title is "Belt (clothing)". The subtitle is "From Wikipedia, the free encyclopedia". The text below the title says "This article has multiple issues. Please help improve it or discuss these issues on the talk page." and "This article may require cleanup to meet Wikipedia's quality standards.".

Each screenshot shows the standard Wikipedia layout with a sidebar on the left and a main content area on the right. The sidebar contains links to various Wikipedia pages, including "Main page", "Contents", "Random article", "Wikipedia store", "Interaction", "Help", "About Wikipedia", "Community portal", "Recent changes", "Contact page", "Tools", "What links here", "Related changes", "Upload file", "Special pages", "Permanent link", "Page information", "Wikidata item", "Cite this page".

Open Questions

Overlapping mention

Joseph Walter “Joe” Jackson, was a steelworker at U.S. Steel. In an interview with Martin Bashir for the 2003 documentary Living with Michael Jackson, Jackson recalled that Joe often sat in a chair with a belt in his hand as he and his siblings rehearsed.

Open Questions

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Open Questions

Coreference

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Open Questions

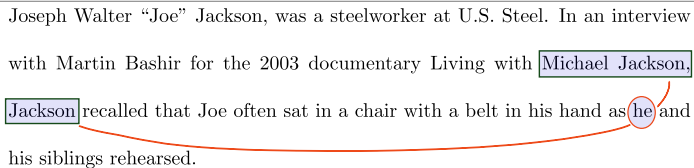
Coreference

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- There is no consensus in the Entity Linking community about what an entity is.

Example annotations produced by four EL systems

Joseph Walter “Joe” Jackson, was a steelworker at U.S. Steel. In an interview with Martin Bashir for the 2003 documentary Living with Michael Jackson, Jackson recalled that Joe often sat in a chair with a belt in his hand as he and his siblings rehearsed.

Example annotations produced by four EL systems

Joseph Walter “Joe” Jackson, was a steelworker at U.S. Steel. In an interview
 $\quad D \quad \quad \quad D|T \quad \quad \quad B|D \quad A|B|T \quad \quad \quad D|T$
 with Martin Bashir for the 2003 documentary Living with Michael Jackson,
 $\quad A|D|T \quad \quad \quad D \quad \quad \quad B|T \quad \quad \quad \text{-----} \quad A|B|D$
Jackson recalled that Joe often sat in a chair with a belt in his hand as he and
 $\quad A|B \quad \quad \quad A \quad \quad \quad T \quad \quad \quad D|T \quad \quad \quad T$
 his siblings rehearsed.
 $\quad \quad \quad D|T$

Example annotations produced by four EL systems

Aida

Joseph Walter “Joe” Jackson, was a steelworker at U.S. Steel. In an interview
 $\begin{matrix} D \\ D|T \end{matrix}$ $\begin{matrix} B|D \\ A|B|T \end{matrix}$ $\begin{matrix} D|T \end{matrix}$
 with Martin Bashir for the 2003 documentary Living with Michael Jackson,
 $\begin{matrix} A|D|T \end{matrix}$ $\begin{matrix} D \\ B|T \end{matrix}$ $\begin{matrix} A|B|D \end{matrix}$
Jackson recalled that Joe often sat in a chair with a belt in his hand as he and
 $\begin{matrix} A|B \end{matrix}$ $\begin{matrix} A \end{matrix}$ $\begin{matrix} T \end{matrix}$ $\begin{matrix} D|T \end{matrix}$ $\begin{matrix} T \end{matrix}$
 his siblings rehearsed.
 $\begin{matrix} D|T \end{matrix}$

Example annotations produced by four EL systems

Aida

Babelify

Joseph Walter “Joe” Jackson, was a steelworker at U.S. Steel. In an interview
 $\frac{D}{D}$ $\frac{D|T}{D|T}$ $\frac{B|D}{B|D}$ $\frac{A|B|T}{A|B|T}$ $\frac{D|T}{D|T}$
 with Martin Bashir for the 2003 documentary Living with Michael Jackson,
 $\frac{A|D|T}{A|D|T}$ $\frac{D}{D}$ $\frac{B|T}{B|T}$ $\frac{A|B|D}{A|B|D}$
Jackson recalled that Joe often sat in a chair with a belt in his hand as he and
 $\frac{A|B}{A|B}$ $\frac{A}{A}$ $\frac{T}{T}$ $\frac{D|T}{D|T}$ $\frac{T}{T}$
 his siblings rehearsed.
 $\frac{D|T}{D|T}$

Example annotations produced by four EL systems

Aida

Babelify

DBpedia Spotlight

Joseph Walter “Joe” Jackson, was a steelworker at U.S. Steel. In an interview
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TagME

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Why is this a problem?

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- Approaches that target different definitions are compared equally.

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- Approaches that target different definitions are compared equally.
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- It is not clear which gold standards follow which definitions.

Our Position



Our Position

Instead of

What is an ‘entity’?

answer

What should Entity Linking link?

Application in Semantic Search

Application in Semantic Search

Finding all documents about US singers

Michael Joseph Jackson was an American singer, songwriter, and dancer. He was invited to the White House ...

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Michael Joseph Jackson was an American singer, songwriter, and dancer. He was invited to the White House ...

Application in Relation Extraction

Application in Relation Extraction

Extract new facts from text

Michael Joseph Jackson was an American singer, songwriter, and dancer. He was invited to the White House ...

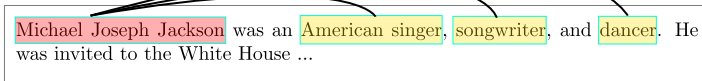
Application in Relation Extraction

Extract new facts from text

Michael Joseph Jackson was an American singer, songwriter, and dancer. He was invited to the White House ...

Application in Relation Extraction

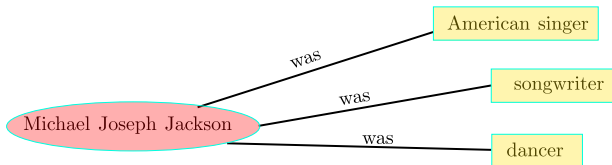
Extract new facts from text



Application in Relation Extraction

Extract new facts from text

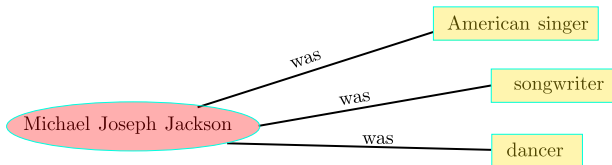
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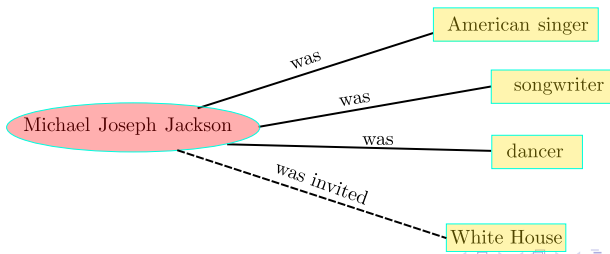
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Application in Relation Extraction

Extract new facts from text

Michael Joseph Jackson was an American singer, songwriter, and dancer. He was invited to the White House ...



- It is not clear what an 'entity' is.
- We need to consider the domain of the application in an Entity Linking environment.

A way forward?

- Create a benchmark dataset with a strict and relaxed version.
- Propose a quality measure that considers both versions of the dataset.
- ...

A way forward?



What should Entity Linking link? [†]

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[†] AMW - Alberto Mendelzon Workshop.