



ΕΘΝΙΚΟ ΜΕΤΣΟΒΙΟ ΠΟΛΥΤΕΧΝΕΙΟ

Σχολή Ηλεκτρολόγων Μηχανικών & Μηχανικών Υπολογιστών

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Εργαστήριο Διοίκησης Πληροφοριακών Συστημάτων

## ΔΙΟΙΚΗΣΗ ΨΗΦΙΑΚΗΣ ΕΠΙΧΕΙΡΗΣΗΣ

8<sup>ο</sup> ΕΞΑΜΗΝΟ

### ΔΙΔΑΣΚΟΝΤΕΣ:

ΚΑΘΗΓΗΤΗΣ ΓΡ. ΜΕΝΤΖΑΣ

Υπεύθυνη Άσκησης: Ξ. Παπαδομιχελάκη

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Ιούνιος 2023

## ΕΡΓΑΣΙΑ 4 ΑΝΑΖΗΤΗΣΗ ΚΑΙ RECOMMENDER SYSTEMS

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## 1. ΑΝΑΖΗΤΗΣΗ – TFIDF

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Υποθέστε ότι πραγματοποιείτε μια αναζήτηση σε μια μηχανή αναζήτησης με τους όρους “earth, mission, astro”. Θεωρείστε σαν μοναδικά δεδομένα της μηχανής τις παρακάτω περιγραφές ταινιών.

α. Χρησιμοποιείστε τη μετρική TF-IDF (χωρίς TF normalization) για να βρείτε ποια θα είναι η κατάταξη των αποτελεσμάτων. Να χρησιμοποιηθεί Cosine Similarity και να ληφθούν υπόψη το κείμενο των τίτλων και οι παράγωγοι/σύνθετες λέξεις (Stemming). Σχολιάστε τα αποτελέσματα.

### Europa Report (2013)

#### PG-13 | 1h 30min | Drama, Mystery, Sci-Fi

A unique blend of documentary, alternative history and science fiction thriller, EUROPA REPORT follows a contemporary mission to Jupiter's moon Europa to investigate the possible existence of alien life within our solar system. When unmanned probes suggest that a hidden ocean could exist underneath Europa's icy surface and may contain single-celled life, Europa Ventures, a privately funded space exploration company, sends six of the best astronauts from around the world to confirm the data and explore the revolutionary discoveries that may lie in the European ocean.

### The Hitchhiker's Guide to the Galaxy (2005)

#### PG | 1h 49min | Adventure, Comedy, Sci-Fi

Earthman Arthur Dent is having a very bad day. His house is about to be bulldozed, he discovers that his best friend is an alien and to top things off, Planet Earth is about to be demolished to make way for a hyperspace bypass. Arthur's only chance for survival: hitch a ride on a passing spacecraft. For the novice space traveler, the greatest adventure in the universe begins when the world ends. Arthur sets out on a journey in which he finds that nothing is as it seems: he learns that a towel is just the most useful thing in the universe, finds the meaning of life, and discovers that everything he needs to know can be found in one book: The Hitchhiker's Guide to the Galaxy.

### The Martian (2015)

#### PG-13 | 2h 24min | Adventure, Drama, Sci-Fi

During a manned mission to Mars, Astronaut Mark Watney (Matt Damon) is presumed dead after a fierce storm and left behind by his crew. But Watney has survived and finds himself stranded and alone on the hostile planet. With only meager supplies, he must draw upon his ingenuity, wit and spirit to subsist and find a way to signal to Earth that he is alive. Millions of miles away, NASA and a team of international scientists work tirelessly to bring "the Martian" home, while his crewmates concurrently plot a daring, if not impossible rescue mission.

### Interstellar (2014)

#### PG-13 | 2h 49min | Adventure, Drama, Sci-Fi

In the near future around the American Midwest, Cooper an ex-science engineer and pilot, is tied to his farming land with his daughter Murph and son Tom. As devastating sandstorms ravage earth's crops, the people of Earth realize their life here is coming to an end as food begins to run out. Eventually stumbling upon a NASA base near Cooper's home, he is asked to go on a daring mission with a few other scientists into a wormhole because of Cooper's scientific intellect and ability to pilot aircraft unlike the other crew members. In order to find a new home while Earth decays, Cooper must decide to either stay, or risk never seeing his children again in order to save the human race by finding another habitable planet.

### Elysium (2013)

**R | 1h 49min | Action, Drama, Sci-Fi**

In the year 2154, two classes of people exist: the very wealthy, who live on a pristine man-made space station called Elysium, and the rest, who live on an overpopulated, ruined Earth. The people of Earth are desperate to escape the planet's crime and poverty, and they critically need the state-of-the-art medical care available on Elysium - but some in Elysium will stop at nothing to enforce anti-immigration laws and preserve their citizens' luxurious lifestyle. The only man with the chance bring equality to these worlds is Max (Matt Damon), an ordinary guy in desperate need to get to Elysium. With his life hanging in the balance, he reluctantly takes on a dangerous mission - one that pits him against Elysium's Secretary Delacourt (Jodie Foster) and her hard-line forces - but if he succeeds, he could save not only his own life, but millions of people on Earth as well.

## 2.ΑΝΑΖΗΤΗΣΗ-PRECISION/RECALL

Ενώ ψάχνετε στοιχεία σχετικά με την ταινία «Contact», η μηχανή αναζήτησης “Google” σας επιστρέφει τα παρακάτω αποτελέσματα.

The screenshot shows a Google search for the word "Contact". The search bar at the top contains the word "Contact" and the Google logo is on the left. Below the search bar, several search results are displayed. The first result is from WordReference.com, showing the definition of "contact" in English and Greek. The second result is from IMDb, showing information about the 1997 film "Contact", including its rating and cast. The third result is from Bab.la, showing the translation of "CONTACT" into Greek. The fourth result is from Google, showing the "Google Contacts" service. The fifth result is from contact.gr, showing information about a company. The sixth result is from Wikipedia, showing the entry for the 1997 American film "Contact".

**WordReference.com**  
https://www.wordreference.com › engr › contact  
**contact - Αγγλοελληνικό Λεξικό WordReference.com**  
contact name n, (name of [sb] to be contacted), άτομο με το οποίο γίνεται η επικοινωνία ;  
contact number n, (phone number), τηλέφωνο επικοινωνίας φρ ως ουσ ουδ.

**IMDb**  
https://www.imdb.com › title  
**Contact (1997)**  
Dr. Ellie Arroway, after years of searching, finds conclusive radio proof of extraterrestrial intelligence, sending plans for a mysterious machine.  
★★★★★ Rating: 7.5/10 · 280,414 votes  
Contact · Jodie Foster in Contact (1997) · Full Cast & Crew · Awards

**Bab.la**  
https://en.bab.la › dictionary › english-greek › contact  
**CONTACT - Translation in Greek**  
Translation for 'contact' in the free English-Greek dictionary and many other Greek translations.

**Google**  
https://contacts.google.com  
**Google Contacts**  
Sign in · For my personal use · For work or my business.


**contact.gr**  
https://www.contact.gr · Translate this page  
**Ηλεκτρονικό Κατάστημα Contact.gr**  
Μίσθωση - Ενοικίαση Φωτοαντιγραφικών Μηχανημάτων, MFPs (Multi-Function Printers), Εκτυπωτές, Καταμετρητές Χαρτονομισμάτων - Κερμάτων.

**Wikipedia**  
https://en.wikipedia.org › wiki › Contact\_(1997\_Amer...  
**Contact (1997 American film)**  
Contact is a 1997 American science fiction drama film directed by Robert Zemeckis, based on the 1985 novel by Carl Sagan. Sagan and his wife Ann Druyan ...  
Production company: South Side Amusement ... Music by: Alan Silvestri  
Budget: \$90 million Produced by: Robert Zemeckis; Steve Star...

 Cambridge University Press & Assessment  
<https://dictionary.cambridge.org/dictionary/contact>

### CONTACT | English meaning - Cambridge Dictionary

contact noun (COMMUNICATION) ... communication with someone, especially by speaking or writing to them regularly: "Have you been in contact with Andrew recently?" ...

 Collins Dictionary  
<https://www.collinsdictionary.com/dictionary/contact>

### Contact definition and meaning | Collins English Dictionary

contact in American English · 1. the act or state of touching; a touching or meeting, as of two things or people · 2. immediate proximity or association · 3. an ...

 Google  
<https://play.google.com/store/apps/details?id=com...>

### Contacts - Apps on Google Play

Back up your **contacts** and sync them across all your devices • Safely back up the **contacts** in your Google Account to the cloud • Access the **contacts** in your ...

★★★★★ Rating: 4.3 · 1,129,352 votes · Free · Android · Communication ⓘ

 Rotten Tomatoes  
<https://www.rotentomatoes.com/1078021-contact>

### Contact


In this Zemeckis-directed adaptation of the Carl Sagan novel, Dr. Ellie Arroway (Jodie Foster) races to interpret a possible message originating from the ...

★★★★★ Rating: 68% · 68 votes ⓘ

 Dictionary.com  
<https://www.dictionary.com/browse/contact>


### Contact Definition & Meaning

contact · the act or state of touching; a touching or meeting, as of two things or people. · immediate proximity or association. · an acquaintance, colleague, or ...

 Merriam-Webster  
<https://www.merriam-webster.com/dictionary/contact>

### Contact Definition & Meaning

Mar 29, 2023 — The meaning of CONTACT is union or junction of surfaces. How to use contact in a sentence. Is contact a verb?: Usage Guide.

 YouTube  
<https://www.youtube.com/watch>

### Contact (1997) Trailer #1 | Movieclips Classic Trailers - YouTube



Check out the official Contact (1997) trailer starring Jodie Foster! Let us know what you think in the comments below.

YouTube · Rotten Tomatoes Classic Trailers · May 1, 2020

 YouTube  
<https://www.youtube.com/watch>

### Kelela - Contact (Official Music Video) - YouTube




Kelela - Contact (Official Music Video) <https://www.kelela.co/From-the-sophomore-album-RAVEN-out-now-via-WARP>.

YouTube · Kelela · Jan 19, 2023

 Wiktionary  
<https://en.wiktionary.org/wiki/contact>


### contact

VerbEdit · (transitive, occasionally proscribed) To touch; to come into physical contact with. The side of the car contacted the pedestrian. · (transitive, ...

 citycontact.gr  
<https://www.citycontact.gr> · Translate this page ⓘ

### City Contact

H City Contact ιδρύθηκε το 1998 με σκοπό να παρέχει έντυπη πληροφόρηση στους επισκέπτες. Έλληνες και ξένους, των μεγάλων ξενοδοχείων της χώρας μας.

 Google  
<https://support.google.com/contacts>

### Contacts Help

Official Contacts Help Center where you can find tips and tutorials on using Contacts and other answers to frequently asked questions.

 WhatsApp  
<https://www.whatsapp.com/contact>

### Contact WhatsApp

Contact WhatsApp. WhatsApp Messenger Support. To better assist you, contact us from your phone by opening WhatsApp > Settings > Help > ...

<https://www.whatsapp.com/contact>

### Contact WhatsApp

Contact WhatsApp · WhatsApp Messenger Support · WhatsApp Business Support · WhatsApp Accessibility and Assistive Technology Support · WhatsApp Enterprise Solutions.

### Rent Contact (1997) on DVD and Blu-ray

Rent Contact (1997) starring Jodie Foster and Matthew McConaughey on DVD and Blu-ray. Get unlimited DVD Movies & TV Shows delivered to your door with no ...

★★★★★ Rating: 3.6 - 4,192,580 reviews

#### Flicks UK

<https://www.flicks.co.uk/movie/contact>

### Contact | Where to watch streaming and online in the UK

How to watch online, stream, rent or buy Contact in the UK + release dates, ... Which Mario movie is better: the new one, or the bonkers old one?

★★★★★ Rating: 68% - 68 votes

#### Pulse Films

<https://www.pulsefilms.com/contact>

### Contact us

Pulse Films is an award-winning production and talent management company with offices in London, Paris, New York & Los Angeles. Contact information.

#### Queens Film Theatre

<https://queensfilmtheatre.com/contact>

### Contact | Queen's Film Theatre

Queen's Film Theatre. 20 University Square, Belfast BT7 1PA. QFT Box Office: 028 9097 1097 (during opening hours)

#### Scandinavian Films

<https://scandinavianfilms.org/contact>

### Contact - SCANDINAVIANFILMS

Search among the Scandinavian Films' contacts details. Feel free to reach out to us and ask for a meeting! Menu. Danish Film Institute; Finnish Film ...

#### Adelaide Film Festival

<https://adelaidefilmfestival.org/contact>

### Contact - Adelaide Film Festival

Contact Adelaide Film Festival if you have any questions, queries, or just want to get in touch! Adelaide Film Festival Adelaide Studios 1 Mulberry Road ...

#### Bristol Film Festival

<https://www.bristolfilmfestival.com/contact-us>

### Contact Us — Bristol Film Festival

How do I redeem this? All of our on-sale events can be found here. If you have a voucher for a film and wine tasting event at Averys Wine Cellars, ...

α. Ποια αποτελέσματα αναφέρονται στην ταινία και ποια όχι; Εξηγήστε με συντομία. Ποια από τα αποτελέσματα είναι σωστά(true positive) και ποια λάθος (false positive);

β. Αν γνωρίζουμε ότι υπάρχουν ακόμη 450 αποτελέσματα που σχετίζονται με την ταινία και δεν βρέθηκαν – false negative – υπολογίστε τα παρακάτω

- i. Precision
- ii. Recall
- iii. F-Measure

Σχολιάστε τα αποτελέσματα.

### 3. RECOMMENDER SYSTEMS

Έξι άνθρωποι αξιολόγησαν τις ταινίες του ερωτήματος 1 με βαθμολογία από 1 (καθόλου καλή) έως 10 (εξαιρετική) και τα αποτελέσματα φαίνονται στον παρακάτω πίνακα. Αντικαταστήστε όπου X τον τελευταίο ψηφίο του Αριθμού Μητρώου σας, αφού προσθέσετε 1

	Sunshine	The Martian	Moon	Contact	Gattaca
Χρήστης 1	X	3		7	7
Χρήστης 2	7	1		2	5
Χρήστης 3	8	2	4	2	X
Χρήστης 4	3	3	2	7	3
Χρήστης 5		3	X	7	6
Χρήστης 6	9	4	5	4	9

- Υπολογίστε την ομοιότητα (similarity) μεταξύ των 6 χρηστών χρησιμοποιώντας δυο μεθόδους: Ευκλείδεια απόσταση και Pearson Correlation.
- Χρησιμοποιώντας K-Nearest Neighbors με  $k=2$  και weighted average και με τις δύο μετρικές του ερωτήματος i. υπολογίστε πως περιμένουμε να αξιολογήσει την ταινία **Moon** ο χρήστης ii. Σχολιάστε τα αποτελέσματα.
- Αν υποθέσουμε ότι χρησιμοποιούμε τις προτιμήσεις των χρηστών στις ταινίες για να προτείνουμε φίλους, τότε ποιες σχέσεις σας φαίνονται πιο πιθανές; Εξηγήστε.